The Thesis Committee for Katherine Elizabeth Bolaños Quiñónez
Certifies that this is the approved version of the following thesis:

Kakua Phonology: First Approach

APPROVED BY
SUPERVISING COMMITTEE:

Supervisor:

Patience Epps

Anthony Woodbury

Kakua Phonology: First Approach

by

Katherine Elizabeth Bolaños Quiñónez, B.A

Thesis

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Master of Arts

The University of Texas at Austin

December 2010

Acknowledgements

This work was only made possible with the support of so many people along this learning process. First, I wish to express my gratitude to the Kakua people in Wacará, for welcoming me into their village. I will like to extend especial thanks to Alicia, Alfredo and their children for offering and accepting me into their house, and for putting up with all the unfair disruptions that my being there meant. I also want to thank Kakua speakers for sharing with me and taking me along into their culture and their language. Special thanks to Marina López and her husband Édgar, to Víctor López, Emilio López, Don Vicente López, Don Aquileo, Laureano, Samuel, Néstor, Andrés, Marcela, Jerson, and Claudia, for helping me through the exploration process of the language, for correcting me and consent to speak and sing to the audio recorder.

I also want to thank the Braga-Gómez family in Mitú for their friendship and support, and for their interest and excitement into this project.

I wish to thank my advisor Dr. Patience Epps who is responsible for me working with the Kakua people, for encouraging me along the way and standing behind me and taking me under her wing. This was all possible thanks to her, her commitment and enthusiasm.

At the University of Texas at Austin I also own my gratitude to Dr. Anthony Woodbury, member of this thesis committee. Thanks also to Dr. Scott Myers and Dr. Megan Crowhurst, for their helpful comments to the description of the tone system. Also at the University of Texas at Austin, I want to extend special thanks to Dr. Nora England for her encouragement, support, and her warmth towards my entire process here at UT Austin.

I also wish to acknowledge and thank the institutions that provided financial support making possible my studies and the research periods upon which this thesis is based. For the field research period of 2009, I received financial support granted by a Tinker Summer Field Research Grant through the Teresa Lozano Long Institute of Latin

American Studies from the University of Texas at Austin. Also, support for this research was provided by the Teresa Lozano Long Institute of Latin American Studies at the University of Texas at Austin from funds granted to the Institute by the Andrew W. Mellon Foundation. A University of Texas Liberal Arts Graduate Research Award (LAGRA) supported research on the Kakua language during the winter break of 2009-2010. Also, during the field research period of 2009-2010 I received a Joel Sherzer Field Research Grant, to which I own my gratitude. Funding for my graduate studies during 2010 came via RA positions with AILLA (Archive of Indigenous Languages of Latin America) and with the project 'Dynamics of Hunter-Gatherer Language Change' (NSF HSD0902114).

Finally, I heartily wish to thank my love and friend Juan Felipe, por la toda la fuerza, el sacrificio y la paciencia por soportar mi ausencia. A mi familia, a mi Papi y mi Mami, gracias por el amor, por el apoyo, por llevarme siempre de la mano, por enseñarme a soñar y por todos los sacrificios, la paciencia y la dedicación. A mis hermanos, Soraya y Vladimir, gracias por la fraternidad, el apoyo y la amistad.

December 2010

Abstract

Kakua Phonology: First Approach

Katherine Elizabeth Bolaños Quiñónez, M.A

The University of Texas at Austin, 2010

Supervisor: Patience Epps

This work presents a preliminary analysis of the phonology of Kakua, an endangered language of the Kakua-Nukak family (formerly classified as Makú). Kakua is spoken by approximately 300 people living in the Vaupés region of the Amazon rain forest, in northwest Amazonia, Eastern Colombia. This analysis is based on data collected with Kakua speakers from the village of Wacará, a settlement of approximately 120 people, living along the basin of Caño Wacará, located between the Querarí and the Vaupés Rivers, to the east of Mitú, close to the Colombia-Brazil borders.

The phonological inventory of Kakua includes five vowels and seventeen consonants. Kakua also presents contrastive prosodic features of nasalization and an inventory of three contrastive tones.

Kakua phonology presents various interesting typological features from both areal and cross-linguistic perspective. The work presented here is a first attempt to provide a better illustration of a little-known endangered language of Amazonia.

Table of Contents

List of Tables

List of Figures and Maps

Abbreviations

1,2,3	First, second, third person
[ˆ]	Falling HL tone
[ˇ]	Rising LH tone
[ˋ]	Low L tone
?ADJVZ?	Adjectivizer
CL	Classifier
DEM	Demonstrative
EMPH	Emphasis
FEM	Femenine
FUT	Future
?IMPER?	Imperative
INTERR	Interrogative
LOC	Locative
MASC	Masculine
NEG	Negative
NON.SENS	Non sensorial evidential
OBJ	Object
PASS	Past
PL	Plural
POSS	Possessive
POT	Potential
PRES	Present
?PROG?	Progressive

REC.PAST	Recent Past
SG	Singular
?VERBZ?	Verbalizer

SECTION 1: KAKUA: THE LANGUAGE AND ITS SPEAKERS

Before I became human, I was an arrow,

...long time ago

Kakua is a member of the small Kakua-Nukak language family.[1] It is spoken in the Vaupés linguistic area, in eastern Colombia. This section introduces a basic description of the Kakua language and its speakers.

The work presented here is based on data from my own fieldwork with Kakua speakers, carried out over a period of 6 weeks from July 2009-Jan 2010. This fieldwork was carried out exclusively in the Wacará community.

This work will not undertake linguistic features outside of phonology, but I briefly summarize some of Kakua's morphosyntactic features here. Kakua has a nominative-accusative alignment and has morphological case marking. Its morphology permits considerable agglutination (especially in verbal morphology) and is predominantly suffixing. Roots often compound to form new words. Also, verb serialization is a very productive grammatical strategy. Kakua's most common constituent order is verb-final SOV, although other orders are also allowed. Animacy is particularly relevant in its systems of differential object case marking and 'split' plural/collective marking.

1.1 A Linguistic Profile of Kakua

Kakua is an Amazonian language spoken by a group of hunting/gathering forest dwellers living within the Vaupés linguistic area in Northwest Amazonia, eastern Colombia. At least two small groups of Kakua people have been identified at present.

[1] The classification of Kakua's language family is not conclusive and as for now it will be assumed to be composed of Kakua and Nukak, the latter spoken outside of the Vaupes area in the Departamento del Guaviare, Colombia. Therefore, it will be called the Kakua-Nukak language family until further research provides us with more information (for discussion of Kakua's classification see Bolanos & Epps 2009)

One of these groups number approximately 200 individuals and are mostly settled in the inland forest village of Wacará (a Nheengatú[2] term, Caño Garza in Spanish) located between the Vaupés and the Querarí Rivers in Colombian territory approximately 100 kilometers east Mitú, near the Brazilian border. This group has experienced some cultural-social change through the Christianization carried out by two missionaries from the SIL since the early 1970s.

The other known group of Kakua people has been reported to inhabit the Colombian portion of the forest region of the Papurí River, along the border with Brazil. The number of speakers in this group is unknown. This group, however, has presumably not experienced much incursion from missionaries. In personal communication with some Kakua young men from Wacará who have encountered other young men from the Kakua group of the Papurí, the men from Wacará suggested that the latter group was less culturally "westernized": *they are not as civilized as we are. They really are savage, they live like animals*. This is a common expression used by Tukanoans when referring to forest dwelling groups in general. Finally, the Kakua people from the Papurí might be the group to which Rivet and Tastevin (1920) referred to as speakers of *the Makú dialect from the Papurí River*. Silverwood-Cope (1972: 108-9) reports three groups of Kakuas, one of which are those in an area near the Macú-Papurí River, a tributary of the Papurí River.

1.2 Sociolinguistic setting

The sociolinguistic context presented in this section is restricted to the Kakua group in the village of Wacará, given that my work to date on Kakua has been exclusively with this group. Future fieldwork is planned with some other Kakua groups, especially the people in the interfluvial region around the Papurí River.

As it will be further described below in Section 1.3, the interactions between hunter-gatherer forest-dwelling peoples and neighboring fishing/agriculture-oriented groups has been characterized as a socially unbalanced relationship in which the forest-

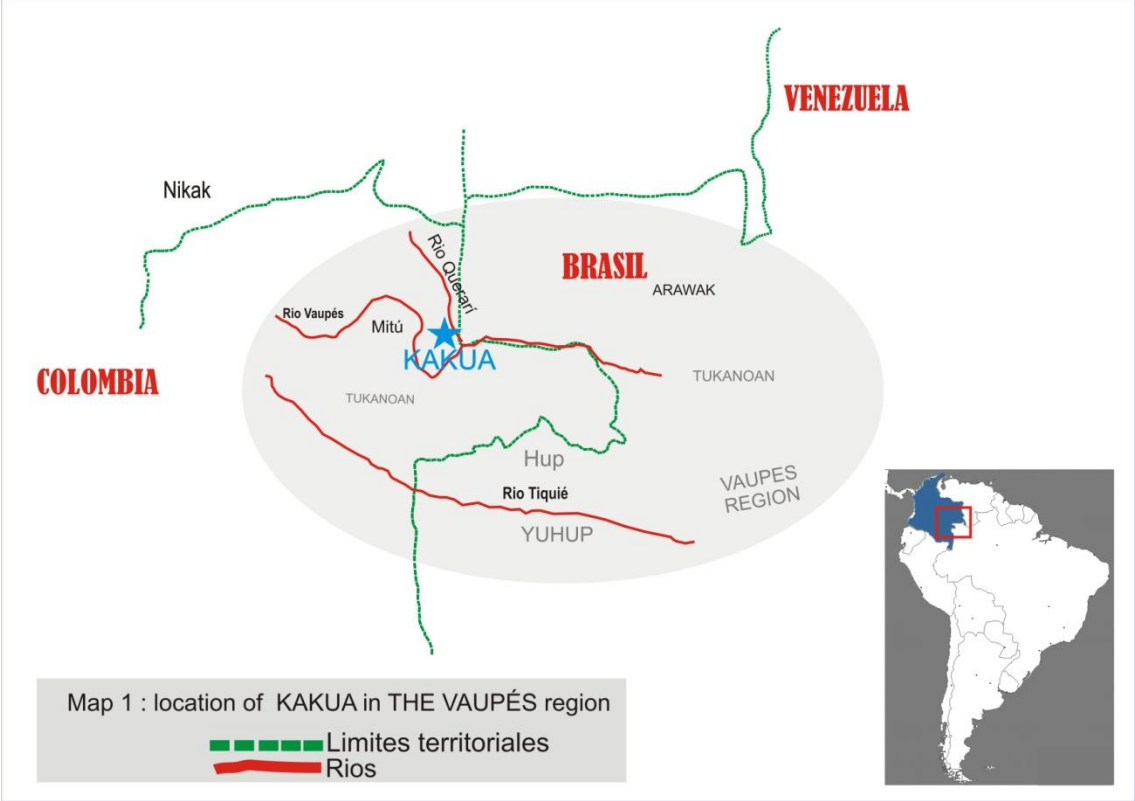
[2] Nheengatú is a language of the Tupi-Guaraní family used as a *lingua franca* in the Amazon basin, especially during the XVI-XIX centuries.

dwelling peoples were considered by the more sedentary fisher-farmer groups as being somehow socially inferior. Because they have lived in the forest, maintaining a hunter-gathering orientation as their subsistence pattern, the Kakua people have long been considered inferior by those groups with whom the Kakua have had social interactions. More about these relations is described in Section 1.3. See Silverwood-Cope (1972) for a detailed description of the Kakua people and their relationships with other groups.

Kakua (*~kak-~wa* = person-PL 'people') is the self-denomination term used by the Kakua people when addressing other non-Kakua people. Their native self-denomination is Bará, and they have been locally referred to as Makú de Cubeo, Makú de Desano, or Makú de Wanano. In the literature, they have also been referenced as Bará (Silverwood-Cope, 1972) and as Cacua. The Ethnologue/ISO code for Kakua is CBV.

As noted above, the Kakua people number approximately 200 (nearly all ethnic Kakua are speakers), most of whom have been recently settled in the village of Wacará, an interfluvial community located between Mitú and the Brazilian border. Cathcart (1973) reports that in her first contact with the Kakua people from Wacará, there were 13 adults and 6 children, this population became larger as Kakua people from other geographic groups came to join those at Wacará. The village of Wacará has now approximately 120 inhabitants, all of them Kakuas with the exception of the school teacher and his family, who are Cubeos. Around 50 more Kakua people live in the Desano village of Pueblo Nuevo, nearer to the Brazilian border, and 9 more are living in the large Wanano settlement of Santa Cruz, on the basin of the Colombian Vaupés River. A rough approximation of the location of the Wacará village is presented in Map 1 below.

Map 1: Location of Wacará-Kakua people in the Vaupés region



A historical description of the Kakua people is given in a detailed anthropological study, Silverwood-Cope (1972) documents a population of about 200 (but no more than 250) Kakua (Bára-Makú) speakers distributed into three regions. One region is located in the tributaries of the Papurí River and is inhabited by 69 Kakua people belonging to two different clans (most of whom had Desano 'patrons'). A second region, with 34 Kakua individuals belonging to five different clans, was located along the Caño Wacará and Caño Churubí; tributaries of the Querarí and the Vaupés rivers. A third region was located along the headwater streams of the Caño Carguero and Caño Cucura, in the upper Vaupés. This third region was inhabited by 21 Kakua-Makú people. However, two groups within this region, one of 28 people and a second one of 20, were recognized by their Cubeo and Wanano neighbors as being Bára-Makú, eventhough these two groups themselves claimed to be Cubeo and Wanano respectively (see Silverwood-Cope 1972:109).

Silverwood-Cope (1972:174) discusses the socio-cultural practices of the Kakua people and describes them as an endogamous group, and although some intermarriages with Hup speakers occurred, the Kakua people showed a complex marital system with restrictions on unions among members of the same clan, which were described as "*mik-hemp-na*" –'to eat oneself' (Silverwood-Cope, 1972:176).

At the time of Silverwood-Cope's study, very few marriages occurred between Makú and Tukanoans; these few cases always involved Makú women marrying with Tukanoan men. These marriages resulted in a shortage of women for Makú men, and overall, Silverwood-Cope reports that the Bára-Makú expressed that there were not enough women to marry.

Silverwood-Cope (1972) documents high bilingualism of Kakua people in one of the Eastern Tukanoan languages with who they were in contact (see discussion below).

Most of the younger generation of Kakua speakers today, however, are monolingual, probably due to their recent settlement in the relatively isolated community of Wacará, which has reduced the contact of the Kakua people with other language groups. Older generations are still bilingual primarily in Cubeo and Wanano. A few more are fluently bilingual in Desano and Siriano.

Historical facts explain the bilingualism in these four languages. The Kakua people claim that after their mythological origin in Ĩpaná Cachivera, near Ayarí, in Brazil, they walked through the forest, migrating west, into Colombian territory. They first settled for short periods of times in the surrounding areas of Caño Leche (*humat-dat*). When game started to become scarce, they went into the forest again, to find a place to hunt, settling in Carurú this time, just a few days' walk to Caño Pajarito, close to the village of Santa Cruz. Today, this village is one of the largest Wanano settlements in the Colombian Vaupés. Formerly, however, this same village was primarily a Cubeo settlement, and because Cubeo and Wanano have intermarriage relationships, these two were the predominant languages spoken in the village[3].

[3] The trajectory of the migration and Wanano and Cubeo relationship with Kakua were told by the oldest Kakua speaker in the community of Wacará and reaffirmed by the community's leader and the second

The Eastern Tukanoan groups engage in a linguistically exogamous marital system, requiring individuals to marry outside of their language group (Sorensen 1967; Jackson 1983). The Kakua people, and forest dweller peoples in general, are excluded from this linguistic exogamy system; as a result, the relationships of the Kakua people with their neighboring Eastern Tukanoan groups has historically been primarily a socio-economic relationship (see Silverwood Cope 1972 for description of Kakua's relationships with other groups). As told by the one of the eldest Kakua from the Wacará village, during the times when the Kakua people of Wacará inhabited the surrounding territories of Santa Cruz while living in the Caño Pajarito area, they actively engaged in socio-economic (and little marital) interactions with the Wanano and Cubeo population of Santa Cruz. It is more likely that this close socio-economic interaction with the peoples of Santa Cruz encouraged the bilingualism of the Kakua people, especially in Cubeo and Wanano, both Eastern Tukanoan languages.

Presumably also, before their contact with the people in Santa Cruz, the Kakua people were in a socially unbalanced relationship with the Desano and Siriano people (who themselves have intermarriage relationships) in the surroundings of the village of Pueblo Nuevo. This was told to me by the oldest man of the village of Wacará (and the history authority of the group), when in an informal conversation he recalled the times (remote times) when "we served the violent Desano people. That was before we fled to Caño Pajarito, to serve the Cubeo who gave us manioc bread and machetes in Santa Cruz". This conversation may suggest that the other Kakua speakers said to be currently living in Pueblo Nuevo belonged once to the same group or were left or stayed behind after another part of the group moved on to the west of the Vaupés. Also, Silverwood-Cope (1972) documentation that many Kakua at the time of his research were fluent in one or more of these four languages (i.e: Cubeo, Wanano, Desano and Siriano), may support this story. Contact with other Tukanoan groups may also have taken place;

---

oldest authority. This demographic migration and the cultural and historical relationships have not yet been investigated further.

however, the contact influence from the four mentioned groups is prioritized given the strong historical social-cultural relationship discussed.

For the current situation of contact, at present I report a lower degree of contact of the Kakua people from Wacará with other Tukanoan groups as compared to what has been described for previous times. Some few teenagers (about four) attend the boarding school in the Wanano village of Santa Cruz. Another group of probably four or five young adults were attending, until December of 2009, a high-school program designed by the Colombian government for adults. This group traveled one Friday a month to Mitú, the Capital city of the Departamento del Vaupés, to attend classes where adults from other indigenous groups are also enrolled in the same program. I do not have exact information about the ethnicity or the language spoken by the other adults attending the government school program; however, what I can say is that classes are held in Spanish, by teachers who are native speakers of Spanish.

As for the older generation, their contact with Tukanoans today is very limited; and although they recognize that they can still remember the Cubeo, Wanano, Siriano or Desano language, I do not recall anyone speaking a language other than Kakua within the Wacará community. In one of my trips, before departing from Mitú to Wacará, I heard Emilio, the Kakua speaker who came to pick me up in Mitú, speaking in Cubeo with a Cubeo person. However, as mentioned above, even though other Kakua people in Wacará do speak Cubeo, it is not a language in use among Kakuas themselves, and it is not being learnt by children living in Wacará.

One final example of contact among different language groups, is one instance of intermarriage between a Kakua man and a Wanano woman from Santa Cruz, whose parents often comes to visit. However, her mother is in fact a Kakua who married a Wanano man from Santa Cruz, and the communication between the spouses is in Kakua. Also, the Kakua people have no longer been "working" (as they say) for the Desano or Wanano people, and have somehow isolated themselves in their settlement in Wacará (probably due to their involvement of the SIL missionaries).

In sum, the Kakua people from the village of Wacará once were in contact with Cubeo, Wanano, Siriano and Desano people from the surrounding area of Santa Cruz while the Kakua were living in the areas nearby Caño Pajarito. The older generation of Kakua speakers are bilingual in one of the Eastern Tukanoan languages with which this group had contact in the past (Cubeo, Wanano, Desano or Siriano, as reported by one of the eldest Kakua speaker in Wacará, and supported by the description in Silverwood-Cope 1972). The younger generation is mostly monolingual (with the exception of the few attending boarding school or other type of education). Children are monolingual and learn Kakua as their first language.

1.3 A problematic grouping

1.3.1 Being a Makú

The Kakua people are often referred to as 'Makú' people by the other people in the region. The term Makú, probably coming from Arawak meaning 'do not talk; without speech' (cf. Baniwa *ma-aku* [NEG-talk]; Ramirez 2001:198, Martins & Martins 1999: 251). Makú has been a name used by agriculturally oriented groups in the Vaupés area to refer to hunter-gatherers, forest dweller oriented groups, regardless of their ethnicity or their language. *Makú* is a very contemptuous denotation. Makús are considered to have a socially inferior status, and their socio-economic relationship with the other indigenous groups of the area (Eastern Tukanoans and Arawak groups) is clearly unbalanced; a Makú is sometimes conceived as *belonging* to a family or individual from a non-Makú group (see also Epps, 2005 for discussion of the term Makú and why it might have become used to group languages).

The negative connotations of this term have not changed much even today. In the broader social context of Colombia, being indigenous is synonymous with being a socially inferior person, poor and naïve. Calling someone an *indian* in the urban context has very negative meaning. When indigenous peoples in the Colombian Vaupés become aware of their potential social embarrassment they claim not to be indigenous: *indio yo? no, indios los Makú, yo no!* ('Me an Indian? no, Indians are the Makú, not me!').

The Makú people do not actively engage in the linguistic exogamy practiced by the Tukano and Arawak people (Jackson 1983; Sorensen 1967). If a marital union does occur between a Tukanoan and a Makú, it is rather a Tukanoan man marrying a Makú woman but rarely the reverse (see exception above of Kakua man who married the Wanano woman). This situation reflects the negative attitude of Tukanoans towards Makú peoples, who are thought to not make ideal spouses because the Makú are hardly considered humans. A Desano speaker in Mitú with whom I was talking in Spanish, and who has a job with the local government, responded as follows to my wanting to find the Kakua people: *para qué quiere trabajar con esos makucitos? ellos viven como animalitos, no son como nosotros* (why would you want to work with those 'little Makú', they live like little animals, they are not like us). Silverwood-Cope (1972:199) reports a strikingly similar statement as this, also from a Desano speaker. Cathcart (1973) reports that the missionaries from SIL at the time working with Desano, Cubeo, and Wanano people had heard these groups referring to some Kakuas as *my makú, our makú*, or *our peccary* (I do not know the motivation for this last term). In sum, the term Makú brings no positive connotation among Tukanoans in the region.

1.3.2 Kakua and the problematic classification of the "Makú" family

I will turn now to the grouping of Kakua into the so-called Makú family. A first statement regarding some similarities between Kakua and two more languages spoken by 'Makú' peoples was suggested by Koch-Grünberg (1906), who proposed a linguistic relationship between Kakua and Yuhup based on about ten similar words among these two languages. It was Rivet & Tastevin (1920) who proposed a grouping of Kakua ("Makú dialect from the Papurí"), not only with languages spoken by other Makú people (i.e. Hup, Yuhup, Dâw and Nadëb), but also including Puinave. Koch-Grünberg (1913: 471) also suggests such similarities between Puinave and languages of Makú people that "extraordinarily reminds (him) phonetically of the Makú language from the Rio Negro"; nonetheless, he does not advocate for a linguistic relationship among Puinave and the languages of the Makú. It is worth noting that at that time not enough was known about

any of these languages as to be able to propose a strong argument for a linguistic relationship among any of them.

Rivet & Tastevin (1920) proposed also Puinave as being related to Makú as members of one single language family. This affiliation has remained widely accepted, and many scholars have built similar classifications based on Rivet & Tastevin's proposal without any strong linguistic evidence of regular sound change. Loukotka (1968:190-3) proposes a Makú stock in which he set together three Makú "dialects": Western Makú, Central Makú and North Makú groups. Other scholars have also favored a Makú grouping including both Kakua and Puinave. J. Greenberg (1960) proposes a Puinave-Makú language family. V. Martins (2005: 331-2, 341) suggested a relationship between two Makú branches: an Eastern Makú branch (Makú Oriental) in which he includes Hup, Yuhup, Daw and Nadeb, and a Western Makú branch (Makú Ocidental) in which he includes Kakua, Nukak (see Cabrera et al. 1999; Mahecha 2009; Mahecha et al. 2000 for linguistic information on Nukak) and Puinave (see Girón 2008 for linguistic description of Puinave); both of Martin's Eastern and Western branches conform what he names a Macro-Makú family. Kaufman (1990) finds a Macro-Puinavean classification a "promising affiliation".

Not all scholars have had such a positive attitude towards a Kakua-Puinave relationship, and while some still accept such terminology, as is the case of Landaburu (2000:43) who groups Kakua into a Makú-Puinave family, they have begun to view this grouping as having a shaky foundation and thust started to use this classification (system) more cautiously while being open to other possible groupings (as well). Epps (2005:10) critically questions the grouping of Kakua and Nukak into the Nadahup language family and evaluates the idea of Puinave being related to the Nadahup grouping. Finally, Bolaños & Epps (2009) take a skeptical position towards the classification of Kakua into the Nadahup language group since they have not found regular sound correspondences to support such a linguistic relationship. Puinave was not included in Bolaños & Epps' comparative study; therefore, at this point Kakua and Nukak are being grouped into the

same family (Kakua-Nukak) without yet having evaluated the possibility of its relationship to Puinave.

1.4 Kakua's history of documentation

The best ethnographic study of Kakua is that of Silverwood-Cope (1972) mentioned above in Section 1.2. Besides this detailed study, there is a short ethnographic description of the Kakua people of Wacará by the SIL missionary Marilyn Cathcart (Cathcart 1973), who until the present is still working on bible translations with a group of five Kakua speakers. The SIL missionary communicates with her group of collaborators in Kakua. Linguistic data on Kakua are also very limited. There is a short list of words by Koch-Grünberg (1906). Martins (2005), Martins & Martins (1999), include some additional linguistic features. La Rotta (1977) provides a short phonological comparison between Kakua and Spanish. Huber & Reed (1992) have also compiled a 375 word-list including Kakua among many languages (though not all of them have Kakua entries). Minimal descriptions are found in a linguistic sketch provided by Cathcart (1972, 1979), and Cathcart & Levinson (1977). Marilyn Cathcart has also developed educational materials, divided into five text-books, in which an orthography for Kakua is proposed. These materials are only used by the few Kakuas working on bible translations with Cathcart (they have tried to teach their family members without significant success). However, in my experience, these textbooks were most commonly used as mats for sitting on the ground or as toys to help keep the small children busy. These textbooks are not publically accessible.

In 2004, Cathcart, together with her group of Kakua collaborators, finished a translation of the New Testament, published by Liga Biblica. Up through my last visit to the Kakua community of Wacará (January 2010), Cathcart has had her group of collaborators working on the translation of the Old Testament, as well as a dictionary of biblical references for Kakua-Spanish-Cubeo. Finally, WALS (wals.info) also references a study on the sounds of Kakua by Anderton (1989), but I have not been able to access this reference.

The linguistic documentation for Nukak, Kakua's sister language, it is also very limited. Danny Mahecha, a PhD student at Vrije Universiteit Amsterdam, is currently working on a linguistic description of Nukak. Published studies including linguistic information of Nukak are: Mahecha (2009), Mahecha et al. (2000), and Cabrera et al. (1999). Thus, very little linguistic information is currently available to provide us with a better understanding about the Kakua-Nukak family.

1.5 Current state of documentation and data

The current linguistic documentation of Kakua has only recently being initiated (summer 2009) through my own field research. The progress made at present is very preliminary, and rather than proposing a conclusive description of some linguistic features of Kakua, this study aims to encourage further investigation by presenting a first approach to the phonological characterization of Kakua and call for future study on a larger scale.

The corpus of the data used for this analysis consists of a 1,210 word-list, derived from transcribed texts and other data recorded during my fieldwork in 2009-2010. The data come from both elicitation and recordings of natural speech.

The results presented in this preliminary analysis reflect discussions with Dr. Patience Epps, the academic advisor of this work. There are striking similarities between the phonological system of Kakua presented here, and that of Hup (Epps 2005). These similarities are particularly remarkable given their apparent lack of genetic relationship (see Bolaños & Epps 2009). These similarities may in part reflect compatible analytical approaches. However, I feel that the analysis presented here best accounts for Kakua phonology according to the data on hand.

SECTION 2: PHONOLOGY

This section presents a preliminary description of Kakua phonology. Kakua shows very interesting phonological features contrasting on both the segmental and the suprasegmental levels. The phonological system of Kakua is characterized by a relatively large segmental inventory compared to its neighboring Tukanoan languages, and contrastive prosodic features (tone and nasalization). Kakua has a fairly simple syllabic structure, where most syllables are of the type CVC; other syllables like CV also occur, although at a lesser rate, and VC syllables have a very restricted context. Most morphemes are monosyllabic and bisyllabic at the maximum.

This section presents a description of Kakua's segmental phonology. Suprasegmental phonology is presented in Section 3. In 4, I present the syllabic structure, and finally 5 presents some aspects of the morphophonemics.

As much as I have attempted to give a detailed description of Kakua phonology as time and availability of data permitted, many questions will remain unanswered at the end of this analysis. The analysis presented here above all encourages more detailed explanation and development in future research.

2.1 Segmental phonology

This section presents a basic description of Kakua's segmental inventory. Compared to most of its Tukanoan neighbors, Kakua shows a fairly large inventory of consonants. While Kakua presents an inventory of seventeen consonant phonemes, most of the neighboring Tukanoan languages display an average of ten to twelve consonant phonemes (Barnes 1999:211). Kakua's five-member vowel inventory, on the other hand, appears quite typical among the East Tukanoan (but not the Nadahup, which have more vowels) languages spoken in the Vaupés area (Barnes 1999: 211).

None of the phonemes in Kakua's phonemic inventory contrast in terms of nasalization; as discussed in detail in 2.2 below, nasalization is a property of the morpheme-level, and is not a property of the individual segment.

In the following discussion, the examples are given in both phonemic and phonetic transcriptions (represented using dashes and brackets, respectively).

2.1.1 Vowels

The Kakua vowel inventory consists of 5 contrastive vowels.

Table 2.1: Kakua's Vowel Inventory

	Front	Central	Back
High	i	~~ɨ~~	u
Mid	e		(o)
Low		a	

As noted above, Kakua's five-vowel system is in fact fairly common among most of its Tukanoan neighbors (Barnes, 1999 proposes a 6 vowel system for proto Eastern Tukanoan: i, ~~ɨ~~, u, e, o, a).

In this inventory, a mid back vowel /o/ is included as a sixth marginal sound. The status of this sound is discussed below in this section.

The vowel inventory does not have contrastive nasal segments; in nasal contexts all of Kakua's five vowels can occur.

The contrasts distinguishing Kakua vowels in oral contexts are shown in Table 2.2 below:

Table 2.2: Kakua's contrastive vowels in oral contexts

i	ʉ	u	e	a
/j'ɪ̂ʔ/ [ʧɪ̂ʔ] 'sprout'	/j'ʉ̀ʔ/ [ʧʉ̀ʔ] 'cross a river'	/j'ùh/ [ʧùh] 'to splash'	/j'èʔ/ [ʧèʔ] 'aunt'	/j'àʔ/ [ʧàʔ] 'on top of'
/bɪ̌k/ [ᵐbɪ̌k] 'one'	/bʉ̌k/ [bʉ̌k] 'caña flecha' sp.		/bèk/[ᵐbèk] 'grow/ripen'	/bǎk/ [ᵐbǎk] 'soil'
/kɪ̌t/ [kɪ̌t] 'cylindrical' CLASSIFIER	/kʉ̀t/[kʉ̀t] 'fire'	/kùk/ [kùk] 'give healing cure/give medicine'	/kět/ [kět] '2pl'	/kad'/ [kad] 'centipede'
/tɪ̂b/ [tɪ̂bᵐ] 'seed'	/tʉ̄b/ [tʉ̄bᵐ] 'be painful'		/tèb'/ [tèb] 'river shrimp'	
/jɪ̂ʔ/ [ⁿdʒɪ̂ʔ] 'be.greasy'	/-jʉ̄ʔ/ [-dʒʉ̄ʔ] 'FRUSTATIVE'	/jūʔ/ [ⁿdʒūʔ] 'to throw'	/jēʔ/ [ⁿdʒēʔ] 'oposite side'	/jǎʔ/ [ⁿdʒǎʔ] 'swim'
/pìʔ/ [pìʔ] 'liana'	/pʉ̂/ [pʉ̂:] 'be.far'	/pù/ [pù:] 'be. fermented'	/pê/ [pê:] 'to continue/follow'	/pǎ/ [pǎ:] 'to raise/increase in size' (inanimates)
/fɪ̂b'/ [fɪ̂b] 'to smoke'	/fʉ̂b/ [fʉ̂bᵐ] 'return/do again'		/fěb/ [fěbᵐ] 'blow air'	
/ʔɪ̂p/ [ʔɪ̂p] 'father'	/ʔʉ̄b/ [ʔʉ̄bᵐ] 'to carry/bring/take'	/ʔǔʔ/ [ʔǔʔ] 'to dream'	/ʔèb/ [ʔèbᵐ] 'to smell bad/body odor'	/ʔǎb/ [ʔǎbᵐ] 'to climb/go.up'
/dì/ [dì:] 'sugar cane'		/dû/ [dû:] 'rapids/waterfall'	/dê/ [dê:] 'similar/related'	
/hɪ̌/ [hɪ̌:] 'to shine'			/hě/ [hě:] 'mountain'	/hâ/ [hâ:] 'to stand up/wake up'

As stated above, vowels do not contrast in terms of nasalization at the segmental level. Table 2.3 below illustrates Kakua's vowels in nasal contexts. Note that all of Kakua's five vowels can occur in both oral and nasal environments:

Table 2.3. Kakua's contrastive vowels in nasal contexts

~i	~ɯ	~u	~e	~a
/~bi̱-/ [mĩ-] '3sg.fem'	/~bɯ̀/ [mɯ̃ː] 'wild pig'	/~bù/ [mũː] 'edge/rim'	/~bê/ [mẽː] 'to warm oneself next to the fire'	/~bâ/ [mãː] 'tree/wood/old (inanimate)'
	/~j'ɯ̂j/ [~j'ɯ̃ĩ̃] 'to step'		/~j'ê̱j/ [j'ẽ̱j̃] 'cocoon'	/~j'ǎj/ [ʧãj̃] 'pile soil to sow'
/~hîh/ [h̃ĩ̃h̃] 'brain'		/~hŭʔ/ [h̃ŭʔ] 'ash'	/~hêʔ/ [h̃ẽʔ] 'to bath'	/~hâʔ/ [~h̃ãʔ] 'too small to fit'
/~ʔĩd/ [ʔĩ̃n] 'mother'	/~ʔɯ̂b/ [ʔɯ̃m] 'be afraid/scared'	/~ʔùb/ [ʔũm] 'anteater'	/~ʔēd/ [ʔẽ̱n] 'to see'	/~ʔa-t-/ [ʔãt-] '3sg.masc+non.first hand.evid'
/~jĭ-/[ɲĩ̆ː] '2pl-'	/~jɯ̆j'/ [ɲɯ̃j̃ʔ] 'chucha, rata de grande de monte'	/~jûj'/ [ɲũj̃ʔ] 'pucker lips making them look like fish's mouths'	/~jèʔ/ [ɲẽ̱ʔ] 'small vein'	/~jâj'/ [ɲãj̃ʔ] 'not well done'
/~dĭd/ [nĩ̆n] 'DEMONSTRATIVE/ this'	/~dɯ̀b/ [nɯ̃m] 'daughter/ to steal'	/~dùd'/ [nũn̰t̰] 'barbasco, fish poison'	/~dèb/ [nẽ̱m] 'guts'	/~dâd'/ [nãn̰t̰] 'swing for babies'

In Table 2.1 (Kakua's vowel inventory) a back mid vowel /o/ is included as a marginal phoneme. Only a limited number of Kakua's lexical words are found to bear this sound [o]:

(1) /hòa/ 'downriver'
/~jakoʔ/ 'crab'
/-j'ôa/ 'nail'
/horaʔ/ 'banana'
/koatá/ 'white fronted spider monkey' (*Ateles belzebuth* sp)

Kakua's word for 'crab' *ɲakoʔ* is also found in Nukak meaning 'tortoise' (Huber & Reed, 1992).

It is important to note that some of these Kakua's words with /o/ sound have lexical resemblances with other of Kakua's surrounding languages (ET languages) and may be loans:

Kakua	Wanano	Tuyuca	English
[hoɾaʔ]	[ho]	[hoʔo]	'*banana*'

None of Kakua speakers accepted [u] in the place of [o] when asked if this was a possibility. Some even claim for a contrast between *hoa* 'downriver', and *hua* 'Wanano'. Nonetheless this contrast was not consistent across speakers. Other speakers will accept *hoa* to mean both 'downriver' and 'Wanano'.

A publication of the SIL offers a sketch phonological comparison of Kakua and Spanish (La Rotta 1977) which includes /o/ as part of Kakua's vowel inventory rather than /u/. This inventory is reproduced here in Table 2.4 below:

Table 2.4. La Rotta (1977:9) Kakua's vocalic inventory

	Front	Central	Back
High	i	ɨ	
Mid	e		o
Low		a	

In this phonological comparison, La Rotta (1977:9), describes /o/ as having variants [o] and [u] in oral environments, and [o] in nasal environments.

Also, Marilyn Cathcart, the SIL missionary who has been working with the Kakua people of Wacará since the 1970s, has developed literacy material in which she has orthographically fused both [o] and [u] sounds into /o/. Her explanation is that since a /ʉ/ phoneme is already in the orthographic representation, a writing system with /o/ will be less likely to be mistaken with /ʉ/ than /ʉ/ and /u/.

As mentioned above, in the corpus of lexical words used for this study, the number of lexical words baring an [o] sound is very limited. This fact, together with the works by the missionaries of SIL suggests several possible analyses for the status of /o/.

One possible analysis is to propose that Kakua does not have a /o/ phoneme and that the cases where /o/ is found are cases of borrowings. A second analysis is to suggest that Kakua had a /o/ ≠ /u/ distinction that was fused overtime into one single phoneme /u/. Also one third analysis is to propose that a split between /o/ and /u/ in Kakua is emergent.

More in-depth study is needed in order to propose a conclusive analysis for the status of /o/ in Kakua, and at this point I do not have a satisfactory explanation or strong evidence to favor either one of the possible hypotheses. One the one hand is the fact that /o/ has a limited occurrence in the corpus of my data and that most of the occurrences of /o/ are very likely candidates for borrowings; nonetheless, this is not strong evidence against the possibility that Kakua has undergone a merger or split of /o/ and /u/

Finally, in future study it should be taken into account that the status of /o/ has conflicting descriptions in Nukak, Kakua's sister. Cabrera et al. (1999) do not include a /o/ phoneme for Nukak, while in Huber & Reed (1992) a /o/ phoneme is found (see *ɲako?* for 'tortoise' in Nukak above). More detail description on the phonology of Nukak will provide key information to help define whether this /o/ sound is a merger or a split in Kakua. If this sound does not actually exist in Nukak then it would support a split in Kakua and providing us with better grounds for a more detailed analysis of the phonology of Kakua.

Most bisyllabic roots in Kakua have vowel harmony, whereby the same vowel quality is shared across the two syllables (see Section 4 below for description of exceptional cases of bisyllabic roots without vowel harmony).

2.1.1.2 Phonotactics of vowels

This subsection summarizes the distribution and restrictions of Kakua's vowels.

Every vowel in Kakua may occur in both oral and nasal environments. Because of Kakua's syllabic structure where roots unexceptionally require an onset (*VC/*V), vowel-initial roots are not encountered in Kakua. Nonetheless, vowel initial suffixes (-VC) do occur and in vowel initial suffixes where the vowel of the root is copied, virtually any of Kakua's five vowels may occur.

Diphthongs and vowel sequences do not appear to be a regular feature of Kakua phonology. However, a very limited number of vowel sequences have been found in the 1210-word current lexical database and at this point I do not have a satisfactory analysis for these type of constructions:

(2) /pea/ [pea] 'to finish'

(3) /hea/ [hea] 'sky'

(4) /hoa/ [hoa] 'down river'

(5) /koatá/ [koatá] 'white fronted spider monkey' (*Ateles belzebuth* sp)

The history of the development of these forms is not yet understood, and a more careful study is recommended for future research in order to propose an analysis for these sequences of vowels.

Vowel length is not a phonemic feature of Kakua's vowel inventory. Vowel length consistently occurs as a phonetic process in open syllables and word-finally open morphemes /CV/ [CV:], and more sporadically in closed syllables with voiced obstruents and glides as codas (it occurs with variation among speakers)

In the corpus of my data I have also found three exceptions where glides combine to form some kind of strange diphthong:

(6) /hja/ [hȷ̀a] 'the boshes/woods'

/hjat/ [hȷ̀at̰] 'place where light is reflected'

/~dȷ̂at/ [nȷ̃ãt] 'everything/everybody'

These three exceptions could be analyzed as being part of the exceptional set of diphthongs where the glide would rather be analyzed as a vowel; alternatively, these examples could be analyzed as a limited set of complex onsets or as a sequence of vowels occurring just in these three restricted examples. More investigation is needed to provide a better explanation that accounts for these exceptional cases.

Finally, Kakua vowels cannot occur in root-initial position, although they can be in affix-initial position.

2.1.2 Consonants

Kakua has fifteen contrastive consonant segments. The consonant inventory is given in Table 2.5 below:

Table 2.5 The Kakua Consonant Inventory

	Bilabial	**Dental-Alveolar**	**Palatal**	**Velar**	**Glottal**
Voiceless Stops	p	t		k	ʔ
Voiced Stops	b	d		g	
Glottalized stops	bʼ	dʼ		gʼ	
Fricatives	f				h
Lateral		l			
Approximant	w		j		
Glottalized Approximants	wʼ		jʼ		

Two of Kakua's consonants, /f/ and /l/, are not encountered in morpheme-final position. The voiced velar stop /g/ and its glottalized counterpart /g'/, on the other hand, only appear in morpheme-final position. From a typological perspective, it is not surprising to find a gap on the voiced velar slot in the phonological inventory of a language (see for example Gamkrelidze 1975, Ohala 1983, Maddieson 1984). Nonetheless, it is indeed very interesting to note that in a large number of languages

spoken in the Vaupés area, the velar voiced stop does not appear in morpheme-initial position, so Kakua's restricted distribution of voiced velar /g/ and its counterpart /g'/ might be responding to an areal feature. Also, probably due to gaps in my data, the series of glottalized consonants appear to also have a restricted distribution (some of which cannot occur in initial position). As for the rest of the other consonants, they can appear in morpheme-initial, medial, and final position.

Nasalization (see section 3.1) is a property of the morpheme, and segments are identified as either fully nasal or fully oral. Under this prosodic feature, non-glottalized voiced stops surface as fully nasal allophones in nasalized contexts or as oral plain voiced stops when in oral contexts. The allophonic variations in oral environments have three different realizations: pre-nasalized (^{N}C) in morpheme-initial position, post-nasalized (C^{N}) in morpheme-final position, and plain voiced when morpheme-medially. Across morpheme boundaries these voiced obstruents can also be medially nasalized (C^{N}C). The realization of voiced stops in oral and nasal contexts is discussed at more length in the subsection on voiced stops below (2.1.2.3).

Kakua's glottalized consonants (orthographically represented as C') are phonetically different from the conventional ejective consonants also represented as C' in other languages. Although they can have a subtle ejective realization, these glottalized consonants in Kakua can be more accurately phonetically described as having a laryngealization effect on the following vowel (when occurring in morpheme-initial position) or as unreleased consonants (when found in morpheme-final position). More discussion regarding this set of consonants if found below in 2.1.2.7.

Kakua's inventory of consonants and their realizations present interesting similarities with other of the Vaupés languages. In addition to the restricted distribution of /g/ in Hup, for example, Epps (2005, 2008) has proposed a series of glottalized stops and glottalized glides. Also, the allophonic variation of nasals and voiced stops, as well as liquid [l] and/or flap [ɾ] as allophones of voiced alveolar /d/ is a very wide spread characteristic through the Tukanoan languages in the Vaupés area (Aikhenvald 2007). Such phonological similarities may be motivated by language contact.

In addition to the phonological similarities to other languages of the region, Kakua's inventory of phonemes also shows interesting differences, such as the labio-dental fricative /f/ and lateral phoneme /l/ (see description below); although they have a restricted distribution, at least at this point of the investigation, they are contrastive with other sounds and are recognized as phonemes.

2.1.2.1. Consonantal allophones and alternations

The allophonic variation of consonant segments is not limited to one specific environment, and more than one factor can determine these variations. The oral or nasal quality of the morpheme, position of the consonant within the morpheme, and/or the quality of the adjacent segments are the more salient factors that could determine the characteristic of the allophonic variation of a given consonant. For example, if the consonant /j/ is found in a nasal context, its allophonic realization will have a [+nasal] quality but also a specific quality subject to its position within the morpheme [ɲ] in morpheme-initial position and [j̃] in morpheme-final position. However, this allophonic realization is also subject to the identity of the segment in the following morpheme.

It is interesting to note that morpheme boundaries have a very relevant weight in determining the surface realization of the consonant, and syllabic boundaries have in fact a less determining role. An example of the importance of the morpheme boundary in allophonic alternation is given by contexts such as sequences of contiguous consonant final morphemes (roots): CVC-CV(C):

(7) /~ʔa-ʔăb-ap-b'e/ [ʔã-ʔăb-ap-bẹ̃]
3SG.MASC-climb/go.up-PAST-REC.PAST
'He just climbed up' (the stairs)

The phonetic realization of /b/ in the example in (1) above is different if the same morphemes were produced in isolation:

(8)	/~ʔa/ [ʔã]	/ʔăb/ [ʔă**b**$^{\underline{\mathbf{m}}}$]	/-Vp-/ [ap]	/-b'e/ [$^{\underline{\mathbf{m}}}$**b**$\tilde{\underline{\mathbf{e}}}$]
	3S.MASC	climb/go.up	PAST	REC.PAST

Note that both instances of /b/ produced by itself undergo pre- and post-nasalization ([ʔă**b**$^{\underline{\mathbf{m}}}$], /-be/ [$^{\underline{\mathbf{m}}}$**b**$\tilde{\underline{\mathbf{e}}}$]). Compare to the phonetic realization in (7) where /b/ does not surface with either pre or post nasalization.

Kakua's consonant inventory displays a wide range of different allophones depending upon their position in the morpheme, whether morpheme-initial, medial, or final.

In the subsections below, the allophones and the distribution of Kakua's consonants will be discussed more in depth, and an illustration of the morphophonemic facts is presented in Section 5. Contrasts between phonetically similar consonants, particularly those having a similar place of articulation, will be shown to support the phonemic status of the consonants being described.

2.1.2.2 Voiceless Obstruents

Voiceless obstruents can appear initially, medially, and finally within the morpheme or syllable. All voiceless obstruents are phonetically unreleased in coda position. When in nasal contexts, these obstruents do not undergo nasalization. All voiceless obstruents are unreleased in final position.

A. /**p**/

The voiceless bilabial stop can occur in morpheme-initial, morpheme-medial and morpheme-final positions. In morpheme-final position its phonetic realization is unreleased [p̚]. Examples illustrating the occurrences of /p/ are found below:

(9) The voiceless bilabial stop in morpheme-initial position is illustrated below, and its phonetic realization is [p]:

/**p**âh/ [pâ:h] ‘guamo fruit’

/~**p**înaʔ/ [pi̊nã̊ʔ] ‘to/goal’

/**p**êʔ/ [pêʔ] ‘revenge/ vengeance’

/**p**êb/ [pêbᵐ] ‘blow into the fire to make it burn’

/~**p**ìh/ [pi̊̃h̃] ‘tail’

(10) In morpheme-final position, the realization of /p/ is [p̚] as illustrated below:

/~jˈà**p**/ [ʧã̊p̚] ‘bewitch’

/jˈù**p**/ [ʧù̥p̚] ‘cross’

/ʔě**p**/ [ʔě:p̚] ‘be sharp’

/~bì**p**/ [mi̊̃p̚] ‘preacher bird’ (bird sp)

(11) The voiceless bilabial stop /p/ when occurring in morpheme internal position is illustrated below and its phonetic realization is [p]:

/fi**p**i/ [fipì] ‘be thin’

/~t~~u~~**p**~~ŭ~~/ [tũ̥pũ̥] ‘to flail about on the ground’

/~ʔâ**p**aʔ/ [ʔã̊**p**ã̊ʔ] ‘weaved basket to place manioc bread’

(12) Minimal pairs illustrating the contrastive distribution of /p/ ≠ /b/, and /p/ ≠ /b’/ is illustrated below:

/**p**âb/	[pâbᵐ]	‘cotton’	/**b**âb’/	[ᵐbâ̰b̰]	‘drink’
/**p**ìʔ/	[**p**ìʔ]	‘liana/piece of forest’	/**b**ìʔ/	[ᵐbìʔ]	‘to hide something’
/ʔě**p**/	[ʔě:**p̚**]	‘be sharp’	/ʔě**b**/	[ʔě:**b**ᵐ]	‘to smell bad’
/**p**ê/	[pê]	‘to follow/continue’	/-**b’**e/	[ᵐb’e̯]	‘REC.PAST’
/hâ**p**/	[hâp̚]	‘young/new’	/bâ**b’**/	[ᵐbâ̰b̰]	‘drink’

(13) Minimal pairs showing the contrastive distribution of /p/ ≠ /w/ are in the examples below:

/**p**ìʔ/	[**p**ìʔ]	‘liana/piece of forest’	/**w**îʔ/	[wîʔ]	‘edible root’
/wà**p**/	[wà**p̚**]	‘to accompany someone’	/~wà**w**/	[w̃ã**w̃**]	‘head’
/mě**p**/	[mě**p̚**]	‘blood’	/~bè**w**/	[mẽ**w̃**]	‘stream’

(14) /p/ is also found in contrastive distribution with /f/:

/~**p**ìh/	[pĩ̀h̃]	‘tail’	/~**f**ìh/	[fĩ̀h̃]	‘to whistle’
/**p**âw’/	[pâwʔ]	‘burning feeling (skin)’	/**f**âw’/	[fâwʔ]	‘fall/slide sideways (animates)’
/**p**êw’/	[pêwʔ]	‘martillar/golpear sobre’	/~**f**êw’/	[fẽ̂w̃ʔ]	‘fall/slide sideways (inanimates)’

B. /**t**/

The voiceless dental-alveolar stop /t/ can occur in morpheme-initial position as the examples in (15), morpheme-final position (16) and morpheme internal position (17). In morpheme-final position its phonetic realization is unreleased [t̚]. Examples illustrating contrastive distributions of /t/ ≠ /d/, /t/ ≠ /d’/, /t/ ≠ /j’/, and /t/ ≠ /l/ are given in (17-21) below.

(15) Voiceless dental-alveolar /**t**/ [t] in morpheme-initial position:

/**t**îb/	[tîbᵐ]	‘seed’
/**t**ûj/	[tûj]	‘to be good’
/**t**èw/	[tèw]	‘to work’

(16) Voiceless dental-alveolar /t/ [t̚]in morpheme-final position:

/~wù**t**/	[w̃ũ̃t̚]	‘defecate’
/hǐ**t**/	[hǐt̚]	‘grate’

(17) Voiceless dental-alveolar /t/ in morpheme internal position:

/~hât**t**iʔ/ [ɦ̃ât**t**ìʔ] ‘before’

/ʔĩ**t**ãʔ/ [ʔĩ**t**ãʔ] ‘metal plate/bowl’

(18) /t/ ≠ /d/:

/**t**àj/	[tàj]	‘to pierce’	/**d**ǎj/	[^{n}dǎj]	‘to break’
/~w~~ù~~**t**/	[w̃~~ù̃~~t̀]	‘name’	/w~~ù~~**d**/	[w~~ù~~d^{n}]	‘stomach’

(19) /t/ ≠ /d’/

/**j’**~~ù~~**t**/	[ʧ~~ù~~t̀]	‘smoke (meat/fish)’	/**j’**~~ù~~**d’**/	[ʧ~~ù~~d̀]	‘aunt’

(20) /t/ ≠ /j’/

/**j’**~~ŭ~~**t**/	[ʧ~~ŭ~~t̀]	‘smoke (meat/fish)’	/**j’**~~ŭ~~**j’**/	[ʧ~~ŭ~~jʔ]	‘manioc bread’
			/j’~~ŭ~~**j’**/	[ʧ~~ŭ~~jʔ]	‘to be inclined, sideways’
/~**t**~~û~~/	[t~~û~~:]	‘fire wood’	/**j’**~~û~~/	[ʧ~~û~~:]	‘pineapple’

(21) /t/ ≠ /l/:

/**t**àh/	[tàh]	‘to poke’	/**l**àh/	[làh]	‘to lay on a surface’

The figures below show two spectrograms illustrating the contrast between glottalized voiced dental-alveolar /d’/, and the voiceless dental-alveolar /t/ in morpheme-final position. Both these phonemes /d’/ and /t/ are audibly very similar.

Figure 2.1: /jʼɨ̀dʼ/ [ʧɨ̀d̰] 'aunt' Spectrum of glottalized voiced dental-alveolar /dʼ/

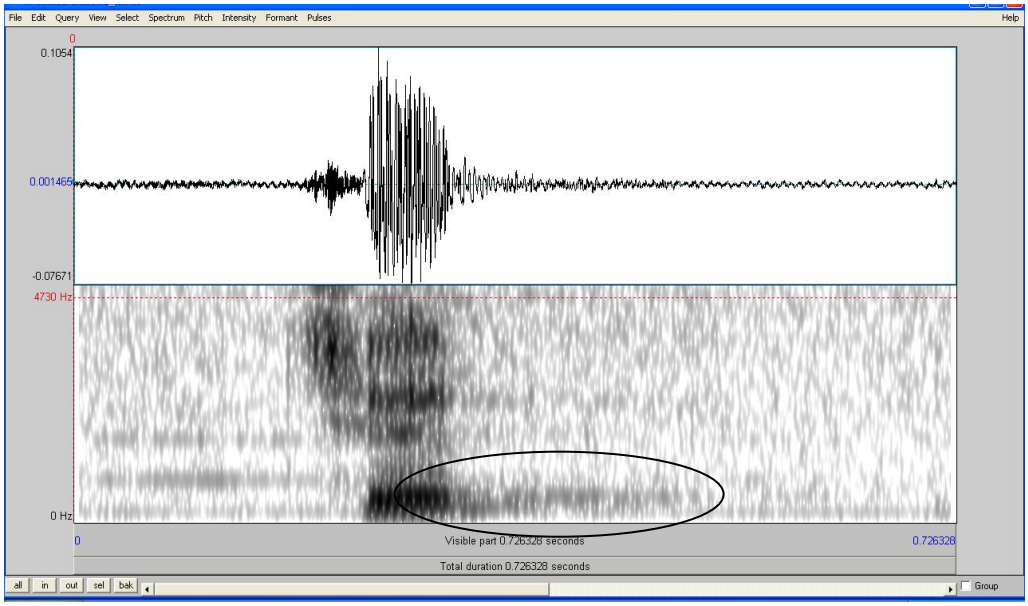
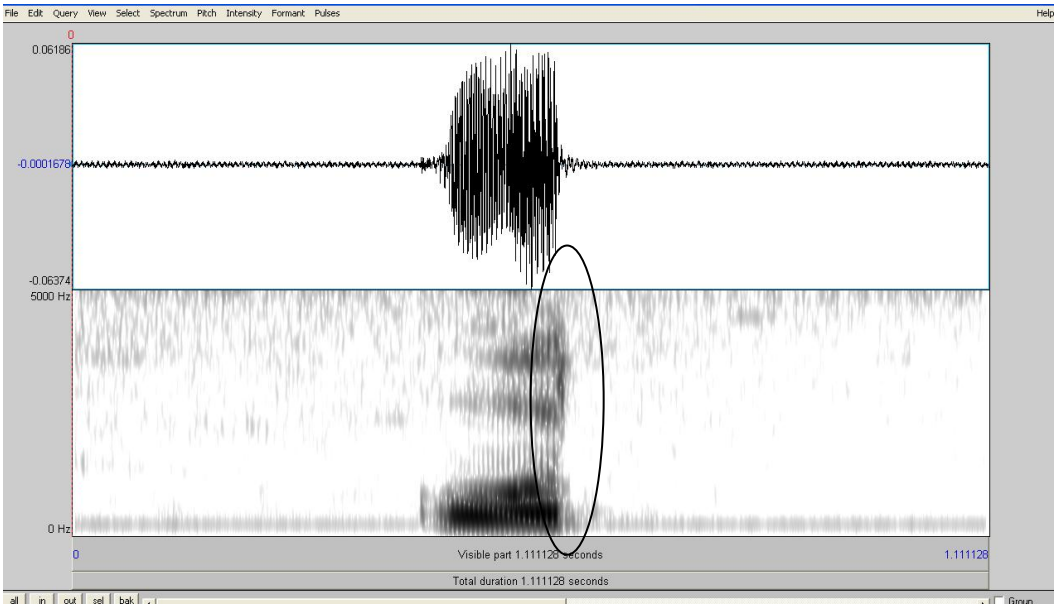


Figure 2.2: /ʔùt/ [ʔùt̚] 'thorn' spectrum of morpheme-final voiceless dental-alveolar /t/



In Figure 2.1 above, the glottalized voiced dental-alveolar stop /d'/clearly contrasts with the voiceless dental-alveolar stop /t/ in Figure 2.2. Compare Figure 2.1 to Figure 2.2. In Figure 2.1 the glottalized voiced stop shows pulses of voicing during its production whereas in Figure 2.2 the voiceless dental-alveolar stop does not.

C. /**k**/

The voiceless velar stop /k/ occurs in morpheme-initial and medial position as [k]. In morpheme-final position its phonetic realization is unreleased [k̚]. The examples below illustrate the contrastive distributions of /k/ ≠ /ʔ/, /k/ ≠ /g/, /k/ ≠ /g'/.

(22) /**k**/ Morpheme-initial:

/**k**ěb/ [kěbᵐ] 'agouti'

/**k**ĭt/ [kĭt̚] 'log/cylindrical shape'

/**k**ŭj'/ [kŭjʔ] 'bullet ant'

(23) /**k**/ Morpheme-medial position:

/bâ**k**aʔ/ [ᵐbâkàʔ] 'body'

/kâ**k**a/ [kâkà] 'frog'

(24) /**k**/ Morpheme-final position:

/dă**k**/ [dăk̚] 'write'

/~bà**k**/ [mã̀k̚] 'any liquid'

(25) /**k**/ ≠ /**ʔ**/

/~j'ă**k**/ [ʤã́k̚] 'chew' /~j'à**ʔ**/ [ʤã̀ʔ] 'to heat up'

/~hŭ**k**/ [ɦ̃ŭk̚] 'to get wet' /~hŭ**ʔ**/ [ɦ̃ŭʔ] 'ashes'

/**k**ěb/ [kěbᵐ] 'lapa' /**ʔ**ěb/ [ʔě:bᵐ] 'to smell bad'

(26) /**k**/ ≠ /**g**/

/~kà**k**/	[kã̀k̀]	‘person’	/kâ**g**/	[kâ**g**ᵑ]	‘put on top/a surface/turn on’
/jǔ**k**/	[yǔk̀]	‘hear/feather’	/jû**g**/	[jû**g**ᵑ]	‘(for a part of the tree) to fall off the tree’

(27) /**k**/ ≠ /**g’**/

/jǔ**k**/	[ʤǔk̀]	‘hair/feather’	/jûg’/	[ʤûg̀]	‘to poke a hole with a stick so the things inside come out’

D. /ʔ/

The glottal stop /ʔ/ can occur in morpheme-initial, medial and final position. (Note that vowel-initial morphemes/words are not allowed in the language; see Section 4 on syllable, morpheme and word structure). The glottal stop in Kakua patterns as a segment on its own, in addition to existing as an autosegmental feature associating with consonants. Examples are presented below to show its contrastive distribution and to support its identity as a phonemic segment.

(28) /**ʔ**/ in word initial position. Note /ʔ/ ≠ /k/ (see also example 19 above).

/~**ʔ**a-/	[ʔã-]	‘3SG.MASC’ (proclitic)	/-**k**a/	[ka:]	‘?IMPERFECTIVE?’
/**ʔ**ìp/	[ʔìp̀]	‘father’			
/~**ʔ**èd/	[ʔẽn]	‘see’	/**k**èd/	[kèdⁿ]	‘to urinate’
/**ʔ**ît/	[ʔît̀]	‘hole’	/**k**it/	[kiť]	‘log/cylindrical shape’

(29) /**ʔ**/ in Word final position. Note /ʔ/ ≠ /k/.

/~bà**ʔ**/	[mã̀ʔ]	‘water/hammock’	/~bà**k**/	[mã̀k̀]	‘river’
/kù**ʔ**/	[kùʔ]	‘to give remedy/give medication’			
/da**ʔ**/	[ⁿdaʔ]	‘CLASSIFIER: rounded’	/dà**k**/	[ⁿdàk̀]	‘to write’
/bǐ**ʔ**/	[ⁿbǐʔ]	‘other’	/bǐ**k**/	[ᵐbǐk̀]	‘one’

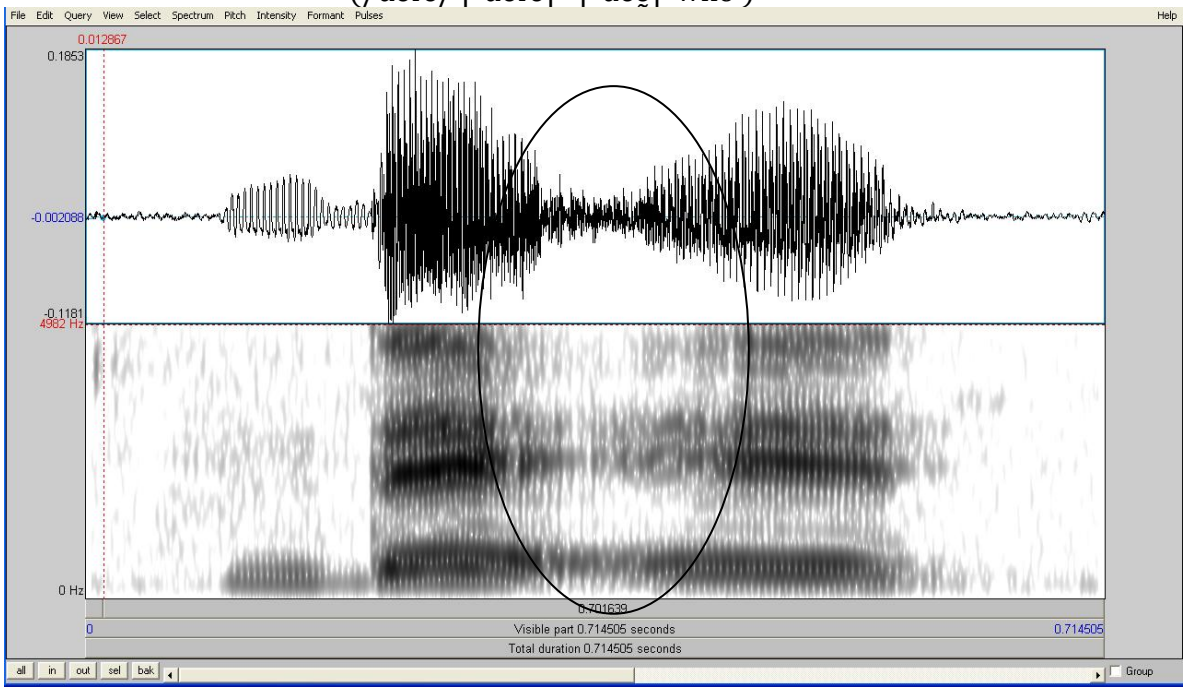
(30) /ʔ/ ≠ /t/

/~jŭʔ/	[ɲŭʔ]	‘swamp’	/~jût/	[ɲût̄]	‘poke with a stick’
/fĭʔ/	[fĭʔ]	‘be.first’	/fĭt/	[fĭt̄]	‘1.PL’
/ʔṵ̀b/	[ʔṵ̀bᵐ]	‘to.bring’	/tṵ̀b/	[tṵ̀bᵐ]	‘to.fell.pain’

(31) /ʔ/ in word medial position

/wîʔi/	[wîʔi]~[wîi̯]	‘not be/not exist’
/dêʔe/	[ⁿdêʔè]~[ⁿdêè̯]	‘who’

Figure 2.3. Medial glottal stop realized as laryngealization on the vowel (/dêʔe/ [ⁿdêʔè]~[ⁿdêè̯] ‘who’)



The occurrence of the glottal stop in word medial position causes laryngealization on the surrounding vowels. Most of the time, the glottal stop in medial position is not fully realized on the surface form, and the vowels are left with traces of laryngealization

(‘creakyness’ on the vowel). This laryngealization primarily affects the vowel following the glottal stop.

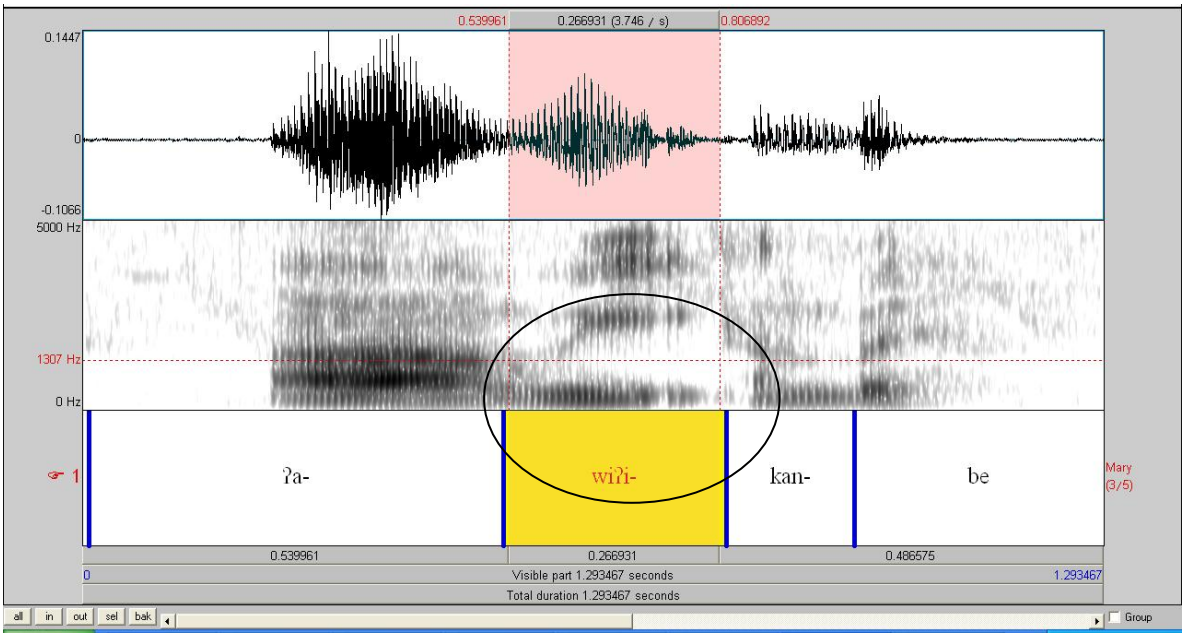
Figure 2.4 below illustrates a case where the glottal stop is not fully realized and a trace of laryngealization can be seen affecting the vowel immediately following the underlying place of the glottal stop.

Figure 2.4. Medial glottal stop realized as laryngealization on the vowel

[*ʔã-wîʔi-kan-b’e*]

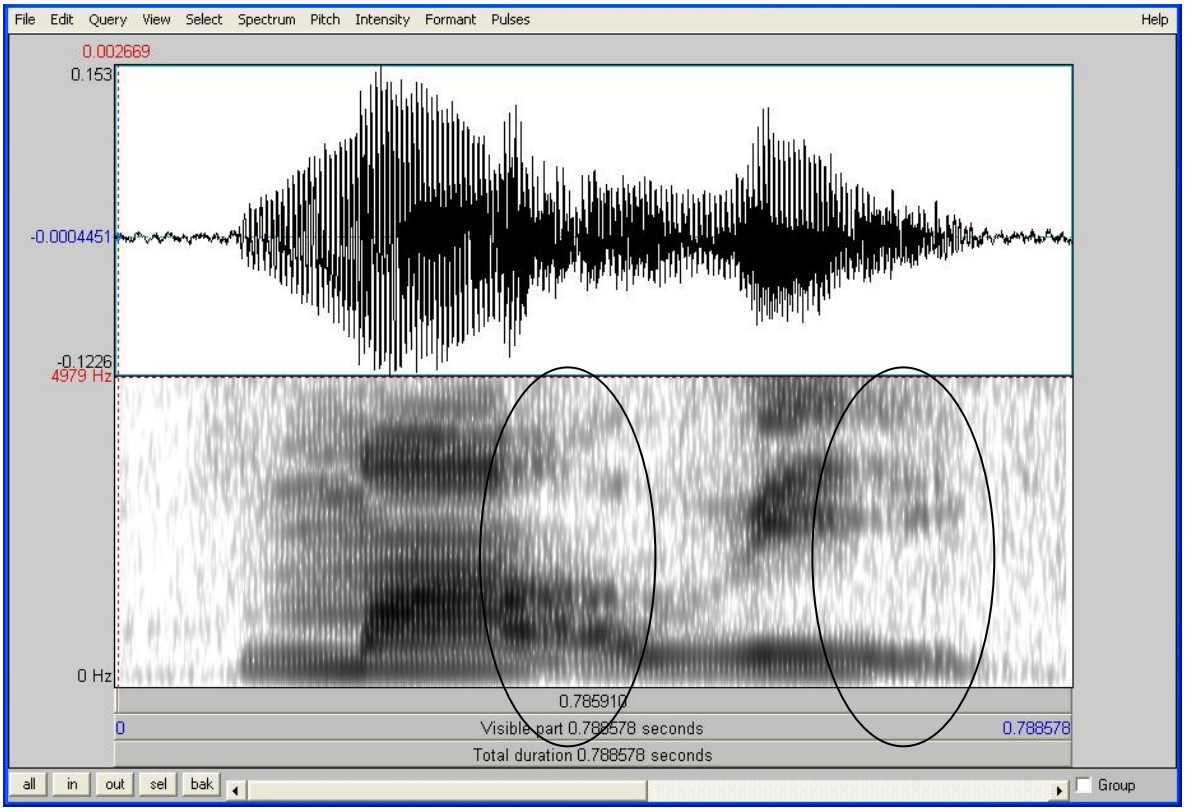
3SG.MASC-**not.be/not.exist**-NEG-REC.PAST

‘He has not been here’



A glottal stop in morpheme-final position can also often affect its preceding vowel with a laryngeal (creaky) quality, as shown in Figure 2.5 where the vowel in the root /~baʔ/ (stressed in the first circle) surfaces with a laryngealization [mą̰] and the glottal segment is not fully realized.

Figure 2.5. Medial glottal stop realized as laryngealization on the vowel (/~baʔ-**wîʔi**/ [mą̰-wḭ̃ʔḭ̃] ‘water-not.exist’ there is no water)



2.1.2.3. Voiced obstruents

Voiced obstruents in Kakua in oral contexts have pre-nasalized allophones in morpheme-initial position, and post-nasalized allophones in morpheme-final position. In nasalized contexts (nasal morphemes) the voiced obstruents are realized as their nasal allophones.

Kakua’s voiced obstruents undergo pre- and post-nasalization subject to their position in the morpheme. Nasality, as it is discussed in Section 3.1, is not a property of the individual segment, therefore it is assumed here that individual segments are

unspecified for nasality at the phonemic level and there is no phonemic contrast between nasal and oral segments. Consequently, obstruents in Kakua are not contrastive on the basis of orality or nasality; rather, they are contrastive on the basis of voicing, meaning voiced stops as opposed to not-voiced, and also in terms of glottalization.

Pre- and post-nasalization represents a salient phonetic property to differentiate voiced stops from voiceless stops. Post-nasalization of voiced stops in morpheme-final position become distinctively audible, making this phonetic property an obligatory realization in speech to contrast voice and voiceless stops.

This section illustrates the realization of voiced obstruents and their allophonic variations in oral or nasal contexts.

A. /**b**/

In morpheme-initial position the voiced bilabial stop /b/ has a pre-nasalized realization [^{m}b], and post-nasalized realization when morpheme-finally [b^{m}]. Word-medially /b/ is commonly realized as [b]. Nasal morphemes are assumed as being underlyingly (lexically) nasal, in these contexts /~b/ is always fully realized as its nasal allophone [m].

Table 2.6 summarizes the allophones of /**b**/ in nasal /~b/ and oral /b/ contexts:

Table 2.6 Allophonic variation of /b/

/b/	**morpheme-initial**	**morpheme-medial**	**morpheme final**
oral context	[^{m}b]	[b]	[b^{m}]
nasal context	[m]	[m]	[m]

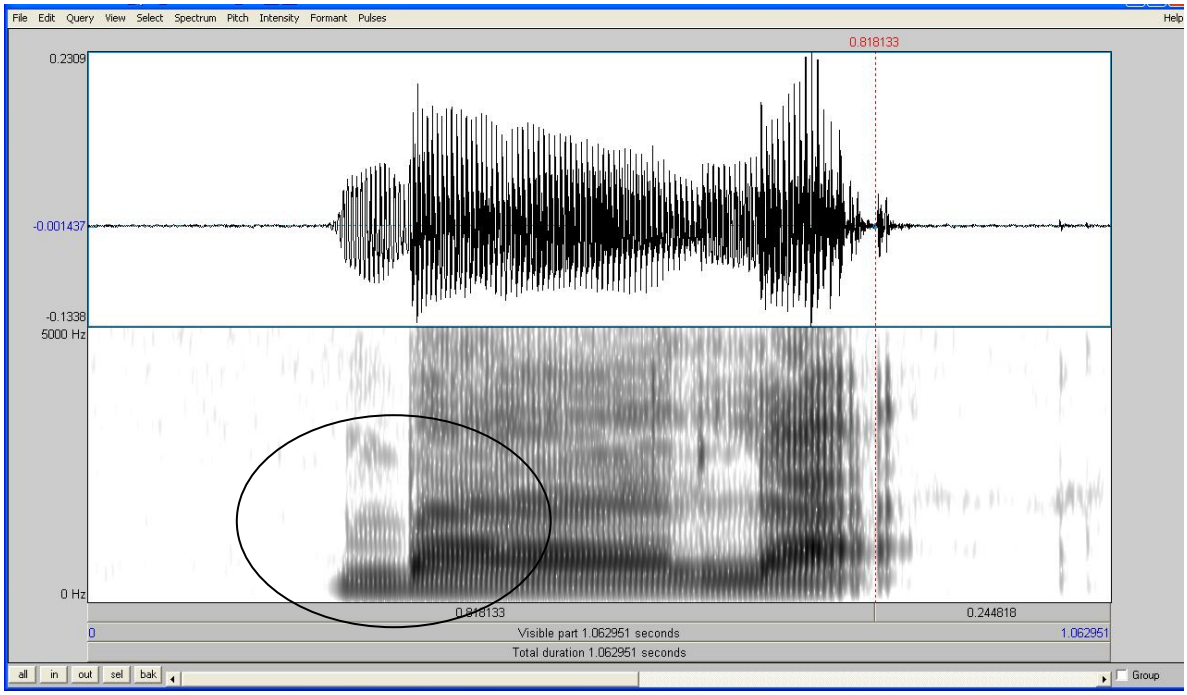
(32) /b/ [^{m}b] in morpheme-initial position:

/bâb'/ [^{m}bâb̰] 'drink'

/bùg/ [^{m}bùg^{ŋ}] 'to pour down rain'

/bâlaʔ/ [^{m}bâlàʔ]~[^{m}bâràʔ] 'squirrel'

Figure 2.6. Pre-nasalization of voiced bilabial obstruent
(/*bâlaʔ*/ [ᵐbâlą̰ʔ]~[ᵐbâràʔ] ‘squirrel’)



(33) Morpheme-finally the bilabial voiced stop /b/ is post-nasalized [bᵐ]

/hî**b**/	[hî:bᵐ] ‘value/price/vengeance’	/ʔă**b**/	[ʔăbᵐ] ‘go.up’
/là**b**/	[làbᵐ] ‘stream’	/bà**b**/	[ᵐbàbᵐ] ‘be ripe’

Figure 2.7. Pre and post-nasalization of voiced bilabial obstruent
(/*bàb*/ [ᵐbàbᵐ] ‘be ripe’)

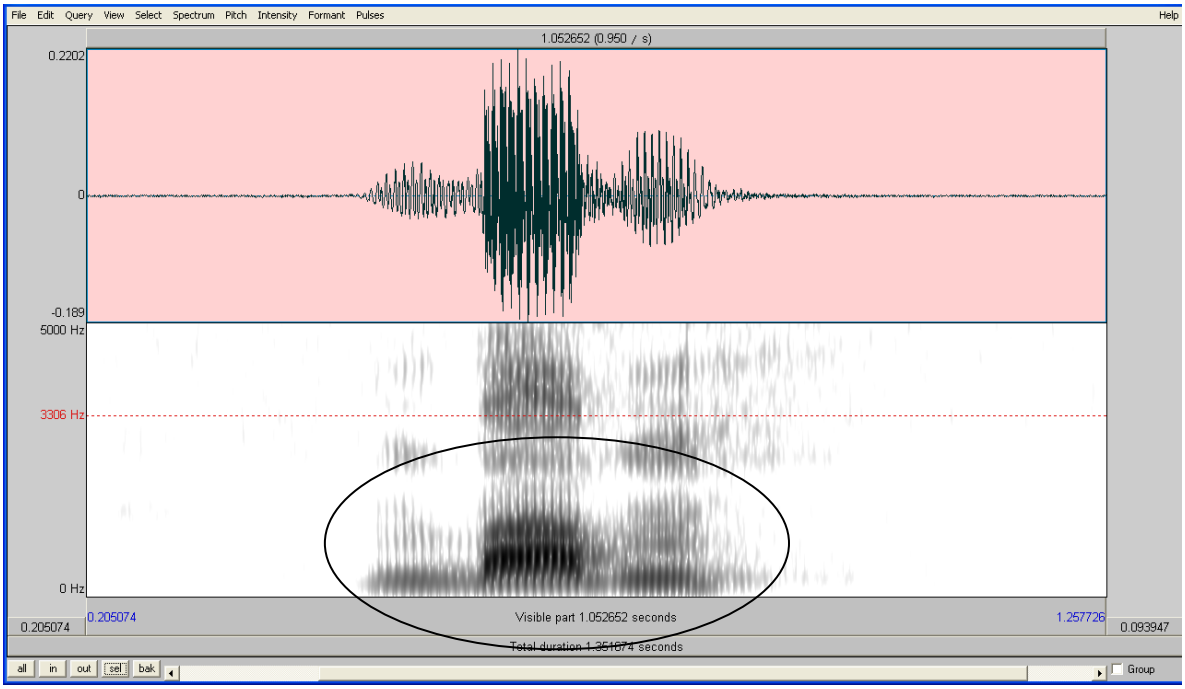


Figure 2.7 above illustrates pre- and post-nasalization in the Kakua word */bàb/* [ᵐbàbᵐ] ‘be ripe’. The nasalization is seen in low sections at the bottom of the energy spectrum, two strong dark lines preceding and following the vowel.

The nasalization portion of post-nasalized obstruents is significantly more salient and audible than in pre-nasalized obstruents. The post-nasalization of voiced obstruents in general is obligatory in final position since the nasal component of the post-nasalized allophone set the phonetic contrast between plain voiced stops and glottalized voiced stops. In cases in which a vowel-initial suffix is added to the post-nasalized final voiced stop, the post-nasalization becomes optional and may even be left out in speech. Imperative mood, for example, is formed by adding a vowel to the root of the verb, thus, when forming the imperative of /ʔă**b/** [ʔăbᵐ] ‘to go up/to climb’, the vowel of the root is reduplicated and the imperative form is /ʔăb-á/ ‘go.up-IMPER’. In cases like this the speakers may or may not post-nasalize the morpheme-final consonant of the root and the

phonetic realization of this form may be [ʔab^{m}a] or [ʔaba]. More discussion on the phonotactics of consonants is given at the end of this in section.

(34) /we**b**it/ [webiɪ̃] ‘child’
/kû**b**ùʔ/ [kû**b**ùʔ] ‘be cold’ (caused by an external factor)

In nasal morphemes /~b/ is fully realized as its nasal allophone [m]

(35) /~**b**ù/ [mɯ̃ː] ‘wild pig’ /~ʔù**b**/ [ʔũm] ‘anteater’
/~**b**aja/ [mãɲã] ‘iguana’ /~ʔî**b**/ [ʔĩm] ‘lake’
/~**b**ù**b**u/ [mũmũ] ‘mushroom’ /~**b**e**b**ě/ [mẽmẽ] ‘to tremble’

As described in Section 3.1, nasalization is a property of the morpheme: thus, a morpheme is realized as either fully oral or fully nasal. A morpheme of the type: /~**b**u**b**u/ [mũmũ] ‘mushroom’ can never be realized as [mũbũ], or [bũmũ] (see Section 3.1 for more detail).

Below are shown contrasts of /b/ ≠ /p/, /b/ ≠ /b’/, /b/ ≠ /f/, and /b/ ≠ /w/.

(36) /**b**/ ≠ /**p**/

/**b**ìʔ/ [^{m}bìʔ] ‘to hide something’ /**p**ìʔ/ [pìʔ] ‘liana’
/~**b**âj/ [mãj] ‘be small’ /~**p**âj/ [pãj] ‘to wait for someone’
/ʔě**b**/ [ʔěːb^{m}] ‘to smell bad’ /ʔě**p**/ [ʔěːp̰] ‘be sharp’

(37) /**b**/ ≠ /**b’**/

/ʔù**b**/ [ʔùb^{m}] ‘bring/take to’ /ʔŭ**b’**/ [ʔŭb̰] ‘ask’
/~fà**b**/ [fã̀m] ‘hormiga arriera’ /~fà**b’**/ [fã̀m̰]~[fã̀mp̰]‘root used in chicha making’
/**b**û/ [^{m}bûː] ‘?LOCATIVE?’ /**b’**ûjup/ [^{m}b’ûyup̰] ‘humming bird’

(38) /**b**/ ≠ /**g**/

/hî**b**/ [hî:b^{m}] ‘value/price/vengeance’ /hî**g**/ [hîg^{ŋ}] ‘to hang a hammock’

(39) /**b**/ ≠ /**d**/

/**b**ă**b**/ [^{m}bă**b**^{m}] ‘be bright/be white’ /**d**ă**b**/ [^{n}dă**b**^{m}] ‘to sink’

/b~~ŭ~~**d**/ [^{m}b~~ŭ~~d^{n}] ‘to be lost’

/~fà**b**/ [fã̀m] ‘cutting ant’(ant sp) /~fa**d**/ [fãn] ‘older sister’

(40) /**b**/ ≠ /**f**/

/**b**èʔ/ [^{m}bèʔ] ‘to grow/to ripe’ /**f**èʔ/ [fèʔ] ‘to be jealous’

/~**b**i/ [mĩ] ‘3SG.FEM’ (proclitic) /~**f**ĩ/ [fĩ] ‘1PL’ (proclitic)

(41) /**b**/ ≠ /**w**/

/ʔù~~ù~~**b**/ [ʔù~~ù~~b^{m}] ‘bring/take to’ /ʔù~~ù~~**w**/ [ʔù~~ù~~w] ‘to sleep’

/~**b**ěb/ [mɛ̃̌m] ‘2sg’ /~**w**ěb/ [wɛ̃̌m] ‘1sg’

/**b**âlaʔ/ [^{m}bâlàʔ] ‘squirrel’ /**w**âlaʔ/ [wâlàʔ] ‘be swollen/bloated’

B. /**d**/

Morpheme-initially, the voiced alveolar stop /d/ has a pre-nasalized realization [^{n}d], and morpheme-finally it is post-nasalized [d^{n}]. /d/ is contrastive with /t/, and /d’/. /d/ is also contrastive with /b/ see examples in (31) above:

(42) /**d**/ ≠ /**t**/ (see also examples in 12 above)

/**d**ăj/ [^{n}dăj] ‘to break’ /**t**àj/ [tàj] ‘to pierce’

/wù~~u~~**d**/ [wù~~u~~d^{n}] ‘stomach’ /-w~~u~~**t**/ [w~~u~~t̪] ‘reported evidential’

(43) /d/ ≠ /d’/

/wì**d**/	[wìdⁿ]	‘mix’	/wì**d’**/	[wìd̰]	‘moon’
/jà**d**/	[ⁿʤàdⁿ]	‘woman’	/jà**d’**/	[ⁿʤàd̰]	‘women’

In morpheme-medial position, /d/ is typically pronounced as a flap [ɾ] while its pronunciation as [d] occurs often in careful speech:

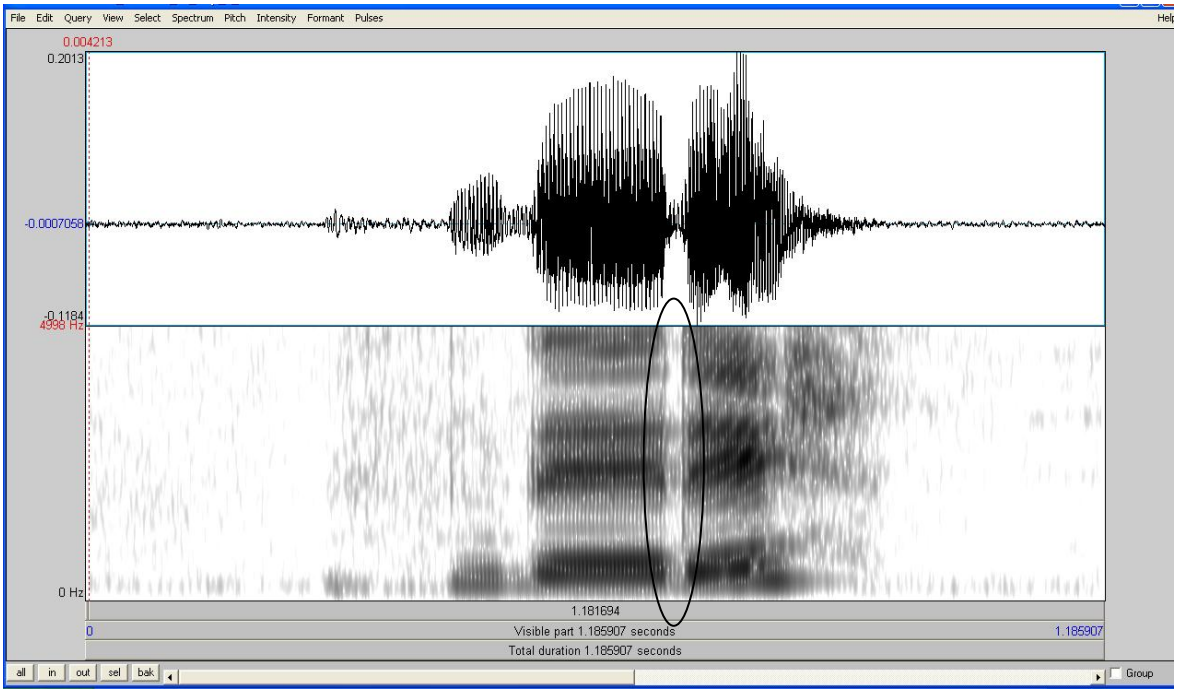
(44) Morpheme-medially /d/

/da**d**ǎʔ/	[ⁿdàɾǎʔ]	‘butterfly’
/hû**d**ù/	[hûɾù]	‘circle’
/bûdi/	[bûɾì]	‘be big/very much’

Figure 2.8 below illustrates /d/ in morpheme-medial position being realized as flap [ɾ]:

Figure 2.8 Morpheme-medial /d/: [ɾ]:

(/**d**e**d**ě/ [^{n}**d**è**ɾ**ě] ‘what’ interrogative)



In nasal morphemes, /~d/ is realized as its nasal allophone [n]:

(45) /~d/: [n]

/~**d**èb/ [nèm] ‘be closed’

/~pî**d**aʔ/ [pĩnãʔ] ‘to (goal)/marks possibility (POT)’

/~fĩ**d**/ [fĩn] ‘yesterday’

Also /d/ is contrastive with the palatal plain voiced glide /j/ (pronounced [dʒ] in morpheme-initial position), and also with the glottalized palatal /j’/:

(46) /**d**/ ≠ /**j**/

/**d**î/	[^{n}dî:]	‘crawl’	/**j**î/	[^{n}ʤî:]	‘grease’
/**d**êj/	[^{n}dêj]	‘descend’	/**j**ěj’/	[^{n}ʤějʔ]	‘poison’
/jà**d**/	[^{n}ʤàd^{n}]	‘woman’	/jà**j**/	[^{n}ʤàj]	‘to ease pain’
/wă**d**/	[wăd^{n}]	‘go in’	/wâ**j**/	[wâj]	‘pull’

(47) /**d**/ ≠ /**j’**/

/**d**ì/	[^{n}dì:]	‘sugar cane’	/**j’**î/	[ʧî:]	‘fall droping’
/j’ŭ**d**/	[ʧŭd^{n}]	‘to sit’	/j’ŭ**j’**/	[ʧŭjʔ]	‘manioc bread’

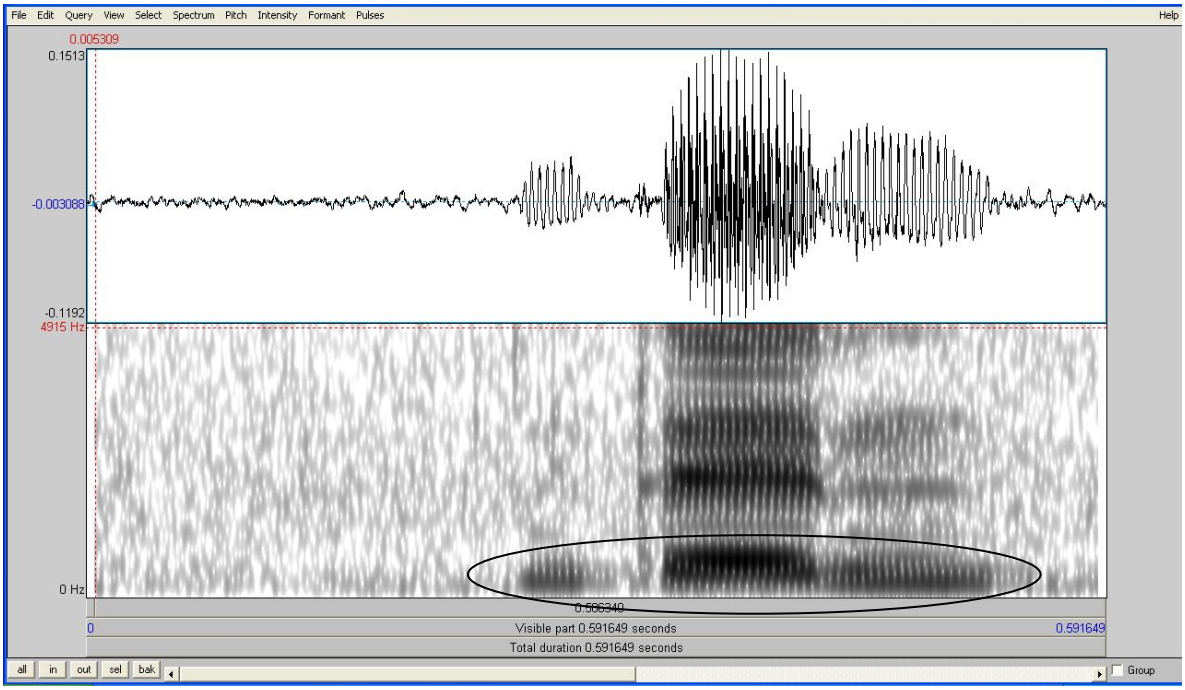
Table 2.7 below summarizes the allophonic variation of /d/ in nasal /~d/ and oral /d/ contexts.

Table 2.7 allophonic variation of /d/

/d/	**morpheme-initial**	**morpheme-medial**	**morpheme-final**
oral context	[^{n}d]	[ɾ] ~ [d] in careful speech	[d^{n}]
nasal context	[n]	[n]	[n]

Figure 2.9 below illustrates pre- and post-nasalization of /d/. The spectrogram shows a strong voicing nasalization preceding the voiced alveolar-stop and following the morpheme-final voiced stop.

Figure 2.9 Pre- and post-nasalization Kakua word /ded/ [ⁿdedⁿ] 'how'



C. /**g**/

Kakua's velar voiced stop has a restricted distribution and cannot occur morpheme-initially. As noted above, it is interesting to note that this restriction on the distribution of /g/ is common to a large number of the languages of the Vaupés area (see for example discussion in Epps, 2007). Also, it is typologically fairly common to find a gap on the voiced velar slot in the phonological inventory of a language (Gamkrelidze 1975, Ohala 1983, Maddieson 1984).

In morpheme-medial position velar voiced stop is realized as [g] and in morpheme-final position its realization is [gᵑ]. Note that /g/ ≠ /d/, /g/ ≠ /g'/, /g/ ≠ /ʔ/, and /g/ ≠ /k/.

(48)

/ʔû**g**/ [ʔûgᵑ] 'beetle (sp.with tongs)' /ʔû**d**/ [ʔûdⁿ] 'younger brother'

/jû**g**/ [ⁿdʒûgᵑ] 'part of the tree that falls off' /jù**g'**/ [ⁿdʒùg̰] 'to comb'

/jù**ʔ**/ [ⁿdʒùʔ] 'frustative'

/bŭ**g**/ [ᵐbŭgᵑ] 'to fall' /bŭ**k**/ [ᵐbŭk̃] 'reed use in weaving of baskets'

(49) Word-medially, the voiced velar /g/ is realized as [g]

/bê**g**ep/ [ᵐbêgèp̚] 'basket for storaging manioc powder'

/hâ**g**ap/ [hâgàp̚] 'spider'

In lexically nasal morphemes /~g/ is fully realized as its nasal allophone /ŋ/:

(50) /~dŭ**g**/ [nŭ̃ŋ] 'to vomit'

/~jà**g**aʔ/ [ɲàŋàʔ] 'plant sp. use to control diarrhea'

Table 2.8 below summarizes the allophonic variation of /g/ in nasal /~g/ and oral /g/ contexts.

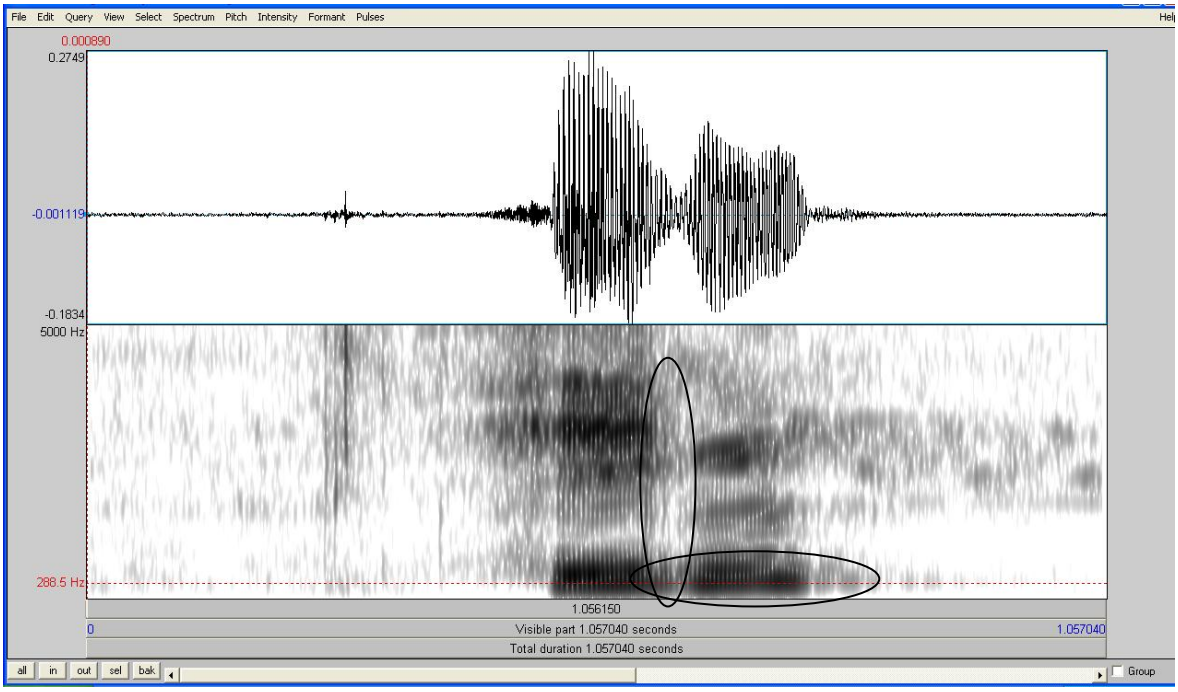
Table 2.8 Allophonic variation of /g/

/g/	morpheme-initial	morpheme-medial	morpheme-final
oral context	no morpheme-initial	[g]	[gᵑ]
nasal context	no morpheme-initial	[ŋ]	[ŋ]

Figure 2.10 below illustrates the post-nasalization realization of morpheme-final voiced velar obstruent /g/:

Figure 2.10 Post-nasalized /g/ in morpheme-final position

(/hîg/ [hîgŋ] ‘to hang hammocks’)



2.1.2.4. Fricatives

Kakua has a set of two fricatives, both of them voiceless: the labio-dental voiceless fricative /f/, and glottal voiceless fricative /h/. It is intriguing that the labio-dental voiceless fricative /f/ is not found as part of the phonological inventory in Nukak, Kakua’s language sister. (It is also not found in the neighboring East Tukanoan languages; see Barnes 1999 and Chacon 2009).

In nasal environments, both of these voiceless fricatives (/f/ and /h/) are nasalized.

A. /**f**/

Kakua’s voiceless labio-dental fricative /f/ is restricted to morpheme-initial position. I have found speaker variation on the realization of this fricative and, although I have not

done study on the dialectal variation among and sub-grouping of the Kakua people, I presume that the variation on the pronunciation of this consonant is related to clan affiliation of the speaker (which historically was probably associated with geographic location). In my visits to the field I have identified that speakers who belong to the same ancestral clan pronounce this consonant quite differently, some of them pronounce it with a labial glide [w] as part of the same segment [f^w]; other group pronounce this consonant as a bilabial voiceless fricative [ɸ]. The majority of the speakers with whom I did audio recordings pronounced this fricative as [f] and for this reason I have deliberately chosen to represent this form /f/ as the underlying form (and in the phonetic transcriptions I am only showing one of the variations of realization of /f/)

(51) Note the contrastive distribution of /f/ ≠ /w/

/**f**ĩb'/	[fḭ̃b̰]	'to smoke'			
/~**f**ʉ̃b/	[fʉ̃m]	'be hard/rigid/solid'			
/**f**ûb/	[fûb^m]	'again/return'	/**w**ûp/	[wûp̰]	'be thick'
/**f**àw'/	[**f**àwʔ]	'to be inclined/to be falling /to be sinking' (animates)	/**w**àw'/	[wàwʔ]	'be in front/ /to show the way/to guide'
/-**f**ùʔ/	[fùʔ]	'still'	/**w**ùʔ/	[wùʔ]	'(big) basket'

(52) /**f**/ ≠ /**p**/

/~**f**àh/	[fãh̃]	'fish sp.(tucunaré)'	/**p**âh/	[pâ:h]	'guamo fruit'
/**f**ûb/	[fûb^m]	'repeat/do again'	/**p**ŭb/	[**p**ŭb^m]	'boil/cook in water'
/~**f**ĩh/	[fĩ̂h̃]	'to whistle'	/~**p**ìh/	[pĩ̂h̃]	'tail'

/f/ is also contrastive with /h/, see examples in (46) below.

In a phonological comparison between Kakua (Wacará variety) and Spanish, La Rotta (1977) claims that Kakua does not have a /f/ sound, and therefore Kakua speakers speaking Spanish assimilated /f/ with /p/ and /h/. She gives the following examples:

(53) La Rotta (1977:13)

Spanish	Kakua	English gloss
foto	[hoto]	photo
foca	[poka]	seal

However, this phonetic assimilation of Spanish /f/ into Kakua /p/ or /h/ appears inconsistent through La Rotta's paper. Further into the paper she gives examples where Spanish fricative sound /f/ is apparently also pronounced [f] in Kakua:

(54) La Rotta (1977:18)

Spanish	Kakua	English gloss
fruta	[furuta]	fruit
fresa	[feresa]	strawberry

Although inconsistent, La Rotta's analysis may suggest two hypotheses that need more investigation. One hypothesis is to assume that in fact Kakua does not have a /f/ sound at all and that I have missed a factor that is relevant to account for the contrasts shown in (53) and (54) above. A second hypothesis is to think that possibly Kakua have developed the fricative /f/ sound during the years following La Rotta's analysis and the origin of /f/ sound in Kakua may respond to a splitting of either /p/, /h/ or /w/ into /f/ and

its original source sound. Or alternatively it could also be the case that either my analysis or La Rotta's have missed something.

B. /**h**/

Kakua's voiceless glottal fricative /h/ occurs in morpheme-initial, morpheme-medial, and morpheme-final positions. It is contrastive notably with glottal stop /ʔ/ and with the voiceless fricative /f/.

When the morpheme is lexically nasal, the voiceless glottal fricative also has a nasal realization.

(55) /**h**ĭ/ [hĭ:] 'to shine/to light'
/**h**âp/ [**h**âp̰] 'new/young'
/**h**ĭ**h**/ [hĭ:h] 'to fly'

(56) **/h/ ≠ /f/**

/~**h**ăw**'**/ [**h̃**ã̆w̃ʔ] 'to come'

/~**f**àh/ [**f**ã̀h] 'fish sp.(tucunaré)'
/**f**àw'/ [**f**àwʔ] 'to be inclined/to be falling/to be sinking' (animates)

(57) **/h/ ≠ /ʔ/**

/~**h**à**h**/ [h̃ã̀:h̃] 'go down river'
/**h**ĕp/ [hĕ:p̰] 'be jelous'
/**ʔ**è**h**/ [ʔèh] 'to call'

/~hà**ʔ**/ [h̃ã̀**ʔ**] 'to cover something'
/**ʔ**ĕp/ [ʔĕp̰] 'sharp'

2.1.2.5. Glides

Kakua has two glides, /w/ and /j/. When in nasal contexts, these glides undergo nasalization. Also note their glottalized counterparts; see below.

A. /**w**/

The bilabial (labio-velar) glide /w/ occurs in morpheme-initial, morpheme-medial, and morpheme-final.

(58) /**w**â**w**/ [wâw] 'head'
/j'î**w**/ [ʧîw] 'carrizo flute/bone flute'
/**w**i**w**ă/ [wìwă]'wasp'
/pa**w**ăʔ/ [pàwăʔ] 'catfish'
/**w**a**w**ă/ [wàwă]'tree branches/CLASSIFIER: hairy/ tree branches like'

(59) In nasal morphemes, Kakua's bilabial glide also undergoes nasalization:
/~ʔù**w**/ [ʔũ̃w̃] 'sleep'
/~**w**ĕj/ [w̃ẽ̃ʃ] 'be weak'

The examples below illustrate /**w**/ contrast with /p/ /b/, and /w'/; also /f/ (see 51 above).

(60) /w/ ≠ /p/, /w/ ≠ /b/

/~**w**ìh/ [w̃ĩ̃h] 'to smell rotten'		/~**p**ìh/ [pĩ̃h] 'tail'	
/ʔè**w**/ [ʔèw] 'to sing/to dance'		/ʔĕ**p**/ [ʔĕp̚] 'sharp'	
		/ʔè**b**/ [ʔèb^{m}] 'to smell bad' (body)	
/**w**ăd/ [wăd^{n}] 'go or be inside/enter'		/**b**ăd/ [^{m}băd^{n}] 'to dig'	

(61) /w/ ≠ /w'/

/hĭ**w**/ [hĭw] 'jaguar'		/hĭ**w'**/ [hĭwʔ] 'guide rituals/like a shaman'	
/pû**w**/ [pû̃w] 'have a mass in the mouth'		/pũ̃**w'**/ [pũ̃wʔ]'to spill'	

/~pâ**w**/ [pɐ̃w̃] ‘breadfruit tree seed’ /~pâ**w’**/[pɐ̃w̃ʔ] ‘have a burning feeling on the skin’

/~ʔ**ʉ̂w**/[ʔɯ̃w̃] ‘to sleep’ /~ʔ**ʉ̂w’**/[ʔɯ̃w̃ʔ] ‘to hide in between’

B. /**j**/

Kakua’s palatal glide /j/ occurs in morpheme-initial, morpheme-medial, and morpheme-final position.

/j/ is pronounced [^{n}ʤ] in both morpheme-initial and medial positions. In nasal contexts it is found morpheme-initially/medially as its nasal allophone [ɲ]. In morpheme-final position its realization is [j]. Across morpheme boundaries its realization is [j] if followed by a voiceless consonant and is [^{n}ʤ] when the consonant of following morpheme is a voiced.

The palatal glide contrasts with its glottalized counterpart /j’/:

(62)

/**j**ĕw/	[^{n}ʤĕw]	‘sun’	/**j’**êw/	[ʧêw]	‘to tie’
/**j**î/	[^{n}ʤî]	‘grease/fat’	/**j’**î/	[ʧî:]	‘to fall in drops/leak’
/**j**ăʔ/	[^{n}ʤăʔ]	‘swim’	/**j’**ăʔ/	[ʧă:ʔ]	‘long thin leaves’

(63) /j/ ≠ /j’/

/~**j’**ă**j**/	[ʧɐ̃ʃ̃]	‘to pile’	/~**j’**ă**j’**/	[ʧɐ̃ʃ̃ʔ]	‘ripe avina fruit’
/**j’**ê**j**/	[ʧêj]	‘to look up’	/**j**ĕ**j’**/	[^{n}ʤĕjʔ]	‘to poison’
/~**j**â**j**/	[ɲɐ̃ʃ̃]	‘to spread’	/~**j**â**j’**/	[ɲɐ̃jʔ]	‘spoilt/not well knitted’
/bà**j**/	[^{m}bàj]	‘small’			
/~ba**j**a/	[mɐ̃ɲɐ̃]	‘iguana’			
/~**j**ĭw/	[ɲĩw̃]	‘net’			

/~**j**i-/ [ɲĩ-] ‘2pl’ prefix

2.1.2.6. Lateral

Kakua has one lateral occurring only morpheme-initially and in intervocalic positions in both nasal and oral contexts. When in intervocalic position, it occurs in free variation with the flap [ɾ].

It is important to note that the set of words containing a morpheme-initial lateral in the corpus is limited to four lexical items. In spite of the reduced number of examples available to strongly claim for the status of /l/ as a phoneme of Kakua’s consonantal inventory, in this work /l/ is analyzed as a phoneme contrastive with /d/ and /t/ and not as an allophonic variation of /d/ or /t/. Two main reasons motivate the claim for the phonemic status of /l/. First is the occurrence of minimal- or near minimal pairs-contrasting /l/ ≠ /d/ and /l/ ≠ /t/ in oral environments as shown in examples (64) below. Second, if /l/ was to be analyzed as an allophone of /d/, it would be expected to have a fully nasal realization [n] in nasal contexts. However, minimal pairs have also been encountered contrasting /l/ and /d/ in nasal environments where /d/ does fully undergo nasalization (surfacing as [n]), while /l/ surfaces as either [l] or [ɾ] in nasal contexts.

Both /l/ and /d/ have an intervocalic flap allophone in oral contexts where the contrast of /l/ and /d/ is neutralized. They only can be identified as one or the other by asking speakers whether either one is accepted; speakers reject one of them:

(64) Note /l/ ≠ /d/, and /l/ ≠ /t/

/**l**àh/	[làh]	‘lay on top of surface’	/**d**ăh/	[ⁿdă:h] ‘to break’
			/**t**àh/	[tàh] ‘to poke’
/**l**àb/	[làbᵐ]	‘smaller stream’	/**d**ăb/	[ⁿdăbᵐ] ‘to sink’
/~pi**l**aʔ/	[pĩlãʔ]~[pĩɾãʔ]	‘to wilt’	/~pî**d**aʔ/	[pĩ̃nãʔ] ‘to (goal)’
/bâ**l**aʔ/	[bâlàʔ]~[bâɾàʔ]	‘squirrel’	/da**d**aʔ/	[daɾaʔ] ‘butterfly’
/~bâ**l**iʔ/	[mâliʔ]~[mâɾiʔ]	‘heron’		

The lateral phoneme /l/ never occurs in morpheme-final position, whether in native lexical words or in loan words.

(65)

Spanish	Kakua	
/pape**l**/	/pape**l**aʔ/	'*paper*'

In the example above a vowel plus a glottal stop are added probably to avoid /l/ in final position. Nonetheless, I do not have evidence to claim that this has indeed been a Kakua process since there are also examples of borrowings from Cubeo that already have the epemthesized form, suggesting that it was already a Cubeo process when it came into Kakua (see more description in Section 4):

ʧilúlaʔ 'pants' Cubeo borrowing (from Portuguese).

Kakua's lateral consonant appears to be quite intriguing. On one hand, it is interesting to note that it has been reported that Nukak, Kakua's sister language, has a flap [ɾ] consonant in its phonemic inventory (see Cabrera et al. 1999:369). On the other hand it is interesting that /l/ is not found as a phoneme in any other of the Vaupés languages (see Barnes 1999 and Chacon 2009 for Eastern Tukanoan; Epps 2005 for Hup; Ospina 2002 for Yuhup). To my knowledge, lateral phonemes in languages spoken in the Vaupés area have been documented only for Tariana, and even there it seems to be also a restricted phoneme with limited occurrences and without clear etymology. (Aikhenvald 2003:29-30)

2.1.2.7. Glottalized consonants

Kakua shows a series of glottalized consonants, including glottalized stops /b'/, /d'/, /g'/, and glottalized glides /j'/, and /w'/. This series of glottalized consonants shows a

wide range of allophonic distinctions depending on their position in the morpheme. In morpheme-final position glottalized consonants are unreleased:

(66) /bâ**b'**/ [^{m}bâb̰] 'to drink' /bà**b**/ [^{m}bàb^{m}] 'to be ripe'

Example (67) above shows a contrastive minimal pair of glottalized and plain voiced bilabial stops, /b'/ ≠ /b/. Note that the glottalized consonant does not contrast in voicing (they are both voiced) with its non-glottalized counterpart (where the glottalized /b'/ is unreleased while the plain /b/ is released and undergo post-nasalization). The example illustrates the distinctive phonetic realization of glottalized consonants (C'), and plain consonants (C), in word final position, where the glottalized voiced stops do not undergo post-nasalization while the plain consonant invariably do surface as post-nasalized.

I. Glottalized voiced obstruents

The series of glottalized stops are only contrastive with plain voiced stops (they are all considered underlyingly voiced). No voiceless stops have voiceless glottalized counterparts. These glottalized voiced stops have a wide range of allophonic variation depending on their position in the morpheme.

In morpheme-initial position (in which only /b'/ and /d'/ appear) glottalized voiced stops are realized as voiced, with a subtle ejective phonetic realization, but most of all having an effect of laryngealization on the following vowel (creaky-voice, like C'V̰). These glottalized segments in morpheme-initial position do undergo pre-nasalization as do their plain voiced counterparts, and their phonetic realization is as ^{N}C'V̰.

In morpheme-final position, all three of the glottalized voiced obstruents can occur, and are phonetically realized as unreleased voiced stops, not undergoing post-nasalization as do their non-glottalized counterparts.

The glottalized voiced stops also have nasal allophones, which are fully realized as nasals in lexically nasal contexts. The examples that I can show here are limited to the

amount of analysis that I have done, but the distribution of the nasal allophones of glottalized voiced stops should be expected to reflect the distribution on the oral contexts. In the nasal contexts, the glottalized consonant, rather than having a laryngealization effect on the following vowel, is phonetically realized as more ejective nasal sound /N'/.

It is audibly very difficult to distinguish the voicing of morpheme-final glottalized stops; however, when a vowel-initial suffix is added to glottalized stops in final position, the contrast with voiceless stops come more salient, revealing the underlying difference between final voiceless stops and final glottalized stops. When a vowel initial suffix is added to a morpheme with a glottalized consonant final root a laryngealization of the vowel in the suffix is systematically audible.

At this point of my research I do not have enough data to fully describe the realization of the set of glottalized voiced obstruents – for example, whether or not these glottalized stops occur in morpheme-medial position, or sufficient examples of minimal pairs. Therefore, I will illustrate the occurrence of these consonants based on the available data. An alternative analysis to the series of glottalized consonants is considered at the end of this section.

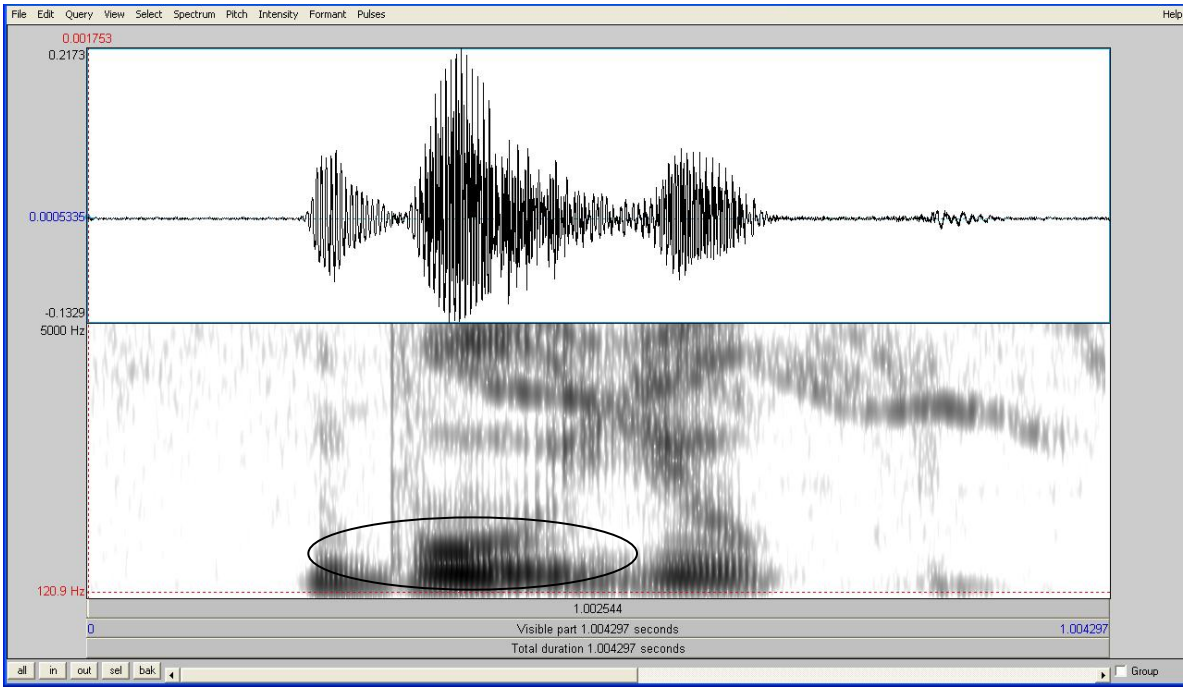
A. **/b'/**

In morpheme-initial position /b'/ has a laryngealization effect on the following vowel and also undergoes a mild pre-nasalization: [^{m}bV̰]. Note that /b'/ ≠ /b/ and /b'/ ≠ /p/.

Figure 2.11 below shows the spectrogram of the Kakua word /bʼûjup/ [^{m}bʼṵ̂yup] 'humming bird'. The spacing in the pulses of the vowel that follows the glottalized stop presents the laryngealization effect that glottalized stops have on their following vowels.

Figure 2.11 Word initial glottalized bilabial voiced stop

(/bʼûjup/ [ᵐbʼṵ̂yup] ‘humming bird’)



(67) Note /b’/ ≠ /b/, and /b’/ ≠ /p/ in word-initial position:

/-**b’**e̱/	[ᵐbʼe̱]	‘REC.PAST’	/**p**ê/	[pê]	‘to follow/continue’
			/**b**ìʔ/	[ᵐbìʔ]	‘hide something’
/**b’**ûjup/	[ᵐbʼṵ̂yuᵖ̚]	‘humming bird’	/**b**û/	[ᵐbû:]	‘?LOCATIVE?’

Morpheme-finally, /b’/ is realized as [b̰]

(68) Note /b’/ ≠ /b/, and /b’/ ≠ /p/.

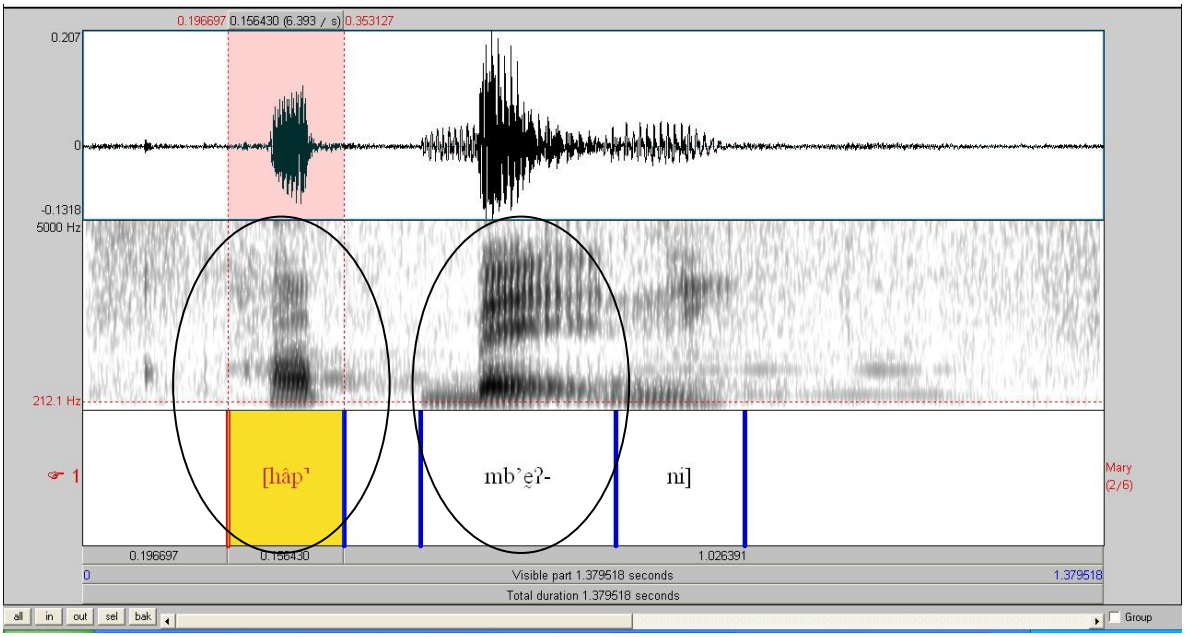
/pìb’/	[pìb̰]	‘edible seed sp’	/dìp/	[ⁿdìᵖ̚]	‘ant’ sp.
/bâ**b’**/	[ᵐbâb̰]	‘drink’	/pâ**b**/	[pâbᵐ]	‘cotton’
			/hâ**p**/	[hâ:ᵖ̚]	‘new/young’

The three figures below illustrate the contrast between /b’/, /b/, and /p/ in morpheme-final position. Note the trace of voicing pulses in Figure 2.13 (morpheme-final /b’/) and compare with Figure 2.12 (morpheme-final /p/).

Figures 2.13 and 2.14 illustrate minimal pairs of glottalized bilabial /b’/ (/bâ**b’**/ [^{m}bâb’] ‘drink’; Fig. 2.13) and plain voiced bilabial /b/ (/bà**b**/ [^{m}bàb^{m}] ‘be white/ripe’; Fig. 2.14).

Figure 2.12 Morpheme-final voiceless bilabial stop

(/hâ**p**/ [hâp̚] ‘young’ in Kakua’s compound word *hâp-b’ę̰-ni* ‘adult’ young+mature+?ADJVZ?)



Compare with Figure 2.13 below

Figure 2.13. Morpheme-final glottalized bilabial stop

(/bâ**b'**/ [ᵐbâb̰] 'drink')

Compare /b'/ ≠ /p/, and /b'/ ≠ /b/

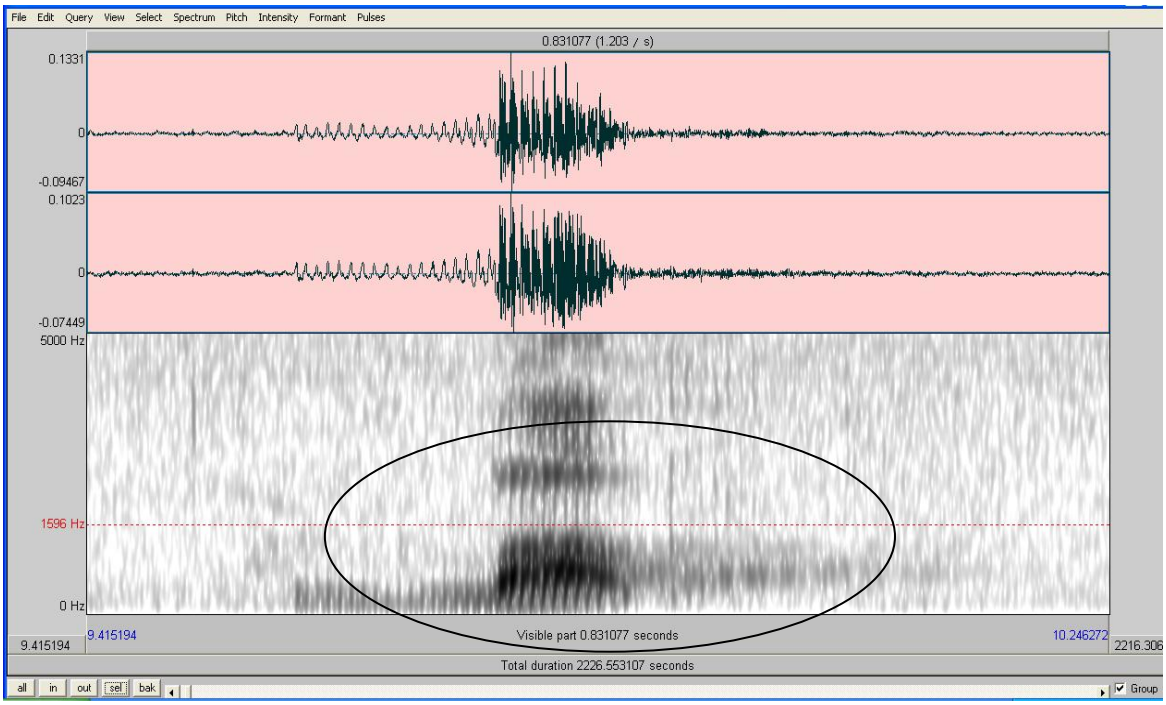
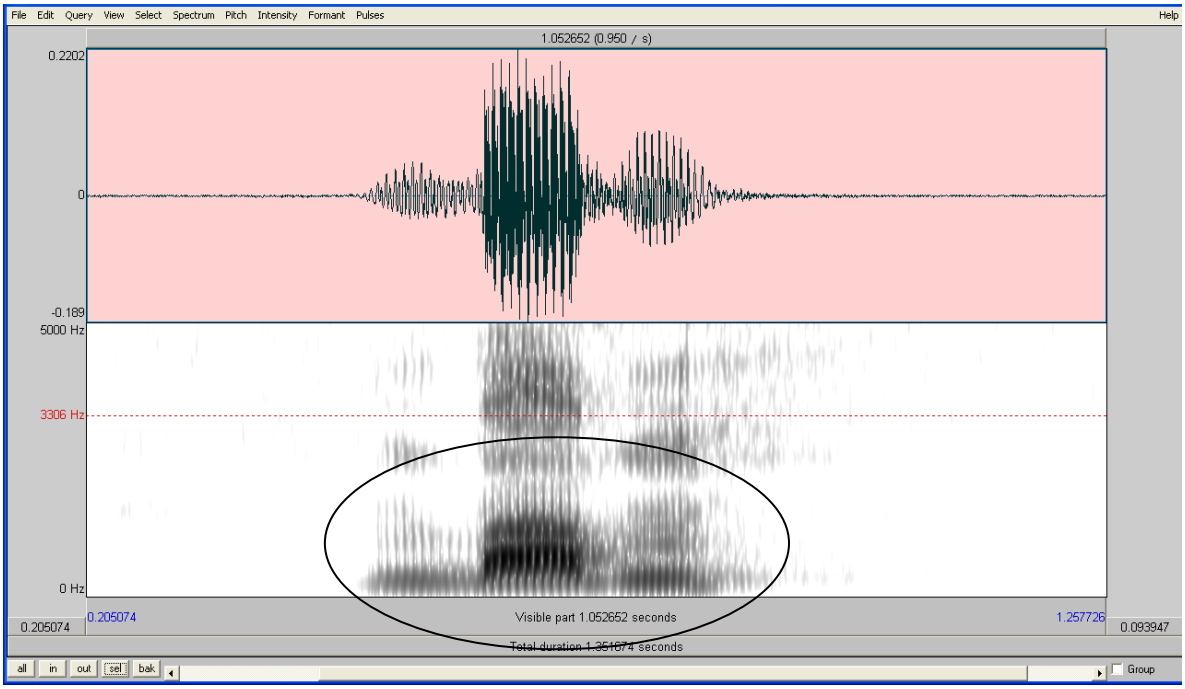


Figure 2.14. Contrast /b/ ≠/b'/ in final position

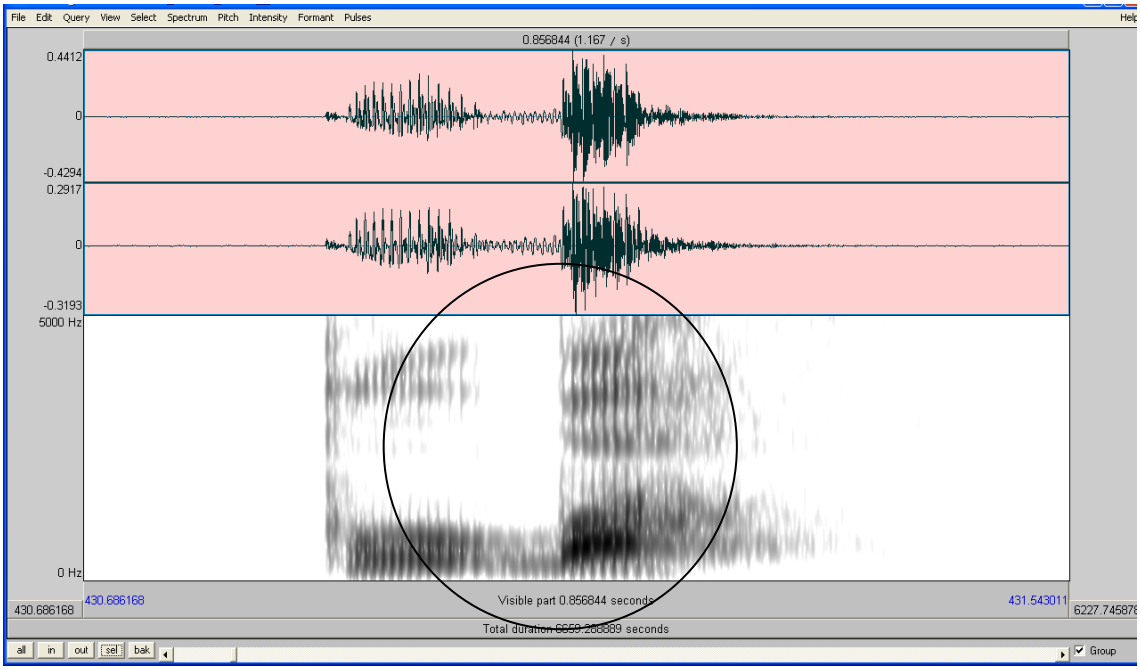
(/*baʔb*/ [^{m}bàb^{m}] 'be ripe')



In morpheme-medial position, the glottalized stop /b'/ is realized as [b̰] and has a laryngealization effect on the following vowel:

(69) /pu**b'**ah/ [pu^{m}ba̰h] ?augmentative?

Figure 2.15. Glottalized voiced bilabial in morpheme-medial position
(/pubʾah/ [pubaʔ] ?AUGMENTATIVE?)



Note the laryngealization effect on the vowel following /bʾ/, as shown by the spacing between the pulses in the vowel portion that follows the glottalized stop.

In nasal environments the allophone of the glottalized voiced stop in morpheme-final position is often realized as a cluster with a homorganic stop as the unreleased portion of the glottalization [NC]:

(70) /~hĕ**bʾ**/ [ɦ̃ĕ̃mp̚]~[ɦ̃ĕ̃m̰] ‘to eat’ ≠ /~hè**b**/ [hẽ̃m]
‘rooster’

≠ /hĕ**p**/ [hĕp̚] ‘to be jealous’

/~fà**bʾ**/ [fã̃m̰]~[fã̃mp̚]‘root use for ≠/~fà**b**/ [fã̃m]
‘cutting antʾ
chicha making’

The homorganic voiceless consonant in the phonetic realization of this glottalized nasal is consistently lost across morpheme boundaries, and the nasal allophone of the glottalized voiced obstruent is realized like the plain voiced stop in nasal environments: e.g. /~hĕb’/ [h̃ĕm̰b̰] is phonetically realized as [hĕm-] across morpheme boundaries when a vowel-initial suffix is added to the root.

Only in careful speech is this difference emphasized:

(71) ~ʔa-~hĕb’-ep-b’e [ʔã-h̃ĕm̰-e̞p-b’e]
3SG.MASC-eat-PAST-REC.PAST
‘He just ate’

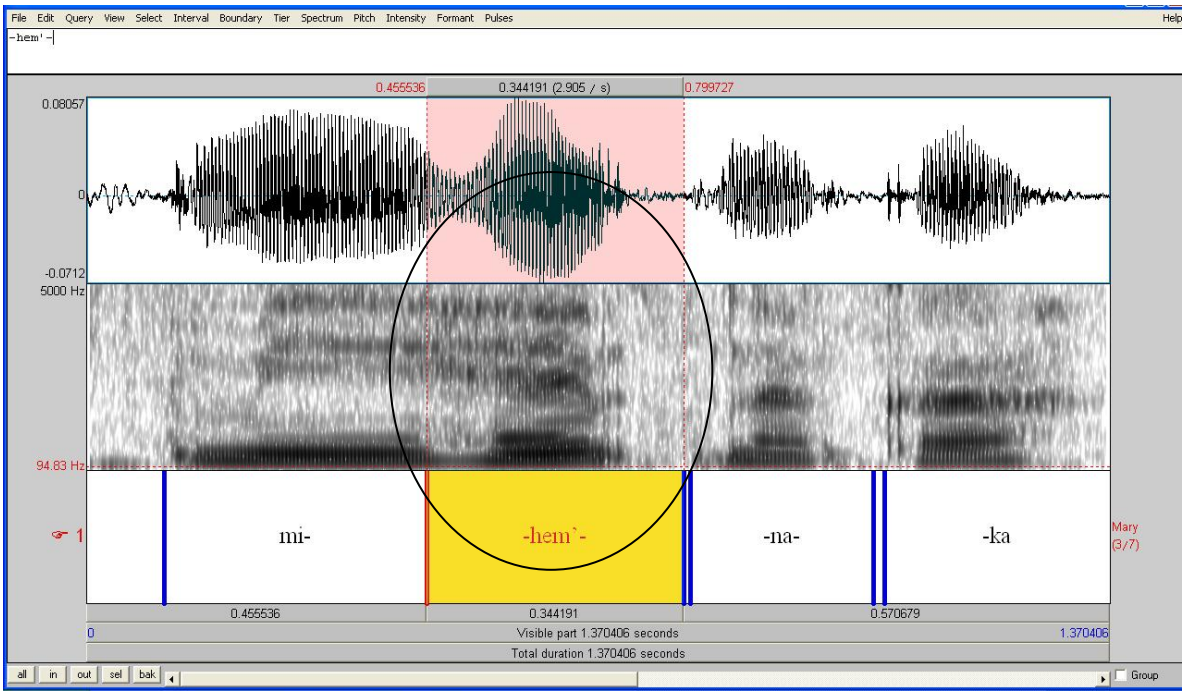
The figures below contrast the phonetic realization of the nasal allophone of the voiced bilabial glottalized stop /~b’/ across morpheme boundaries between consonant initial suffix and vowel-initial suffix:

Figure 2.16: Glottalized bilabial voiced stop /~b'/ in nasal context followed by C initial suffix

/~bi-~hĕb'-~da-ka/ [mĩ-ɦ̃ɛ̃m̰-nã-ka]~[mĩ-ɦ̃ɛ̃mp̰-nã-ka]

3SG.FEM-eat-PRES-?IMPERF?

'She is eating'



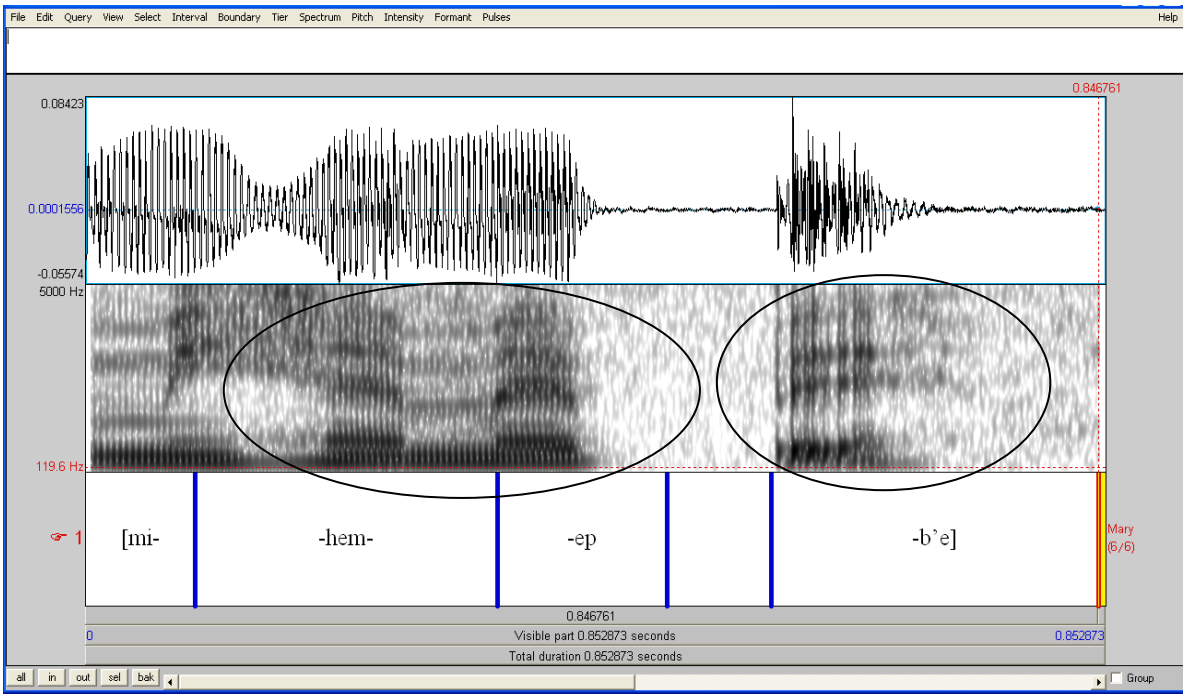
Note that in the area stressed in the circle the glottalized stop in morpheme-final position shows a salient spacing on the pulsing of the frequency energy.

Figure 2.17: Phonetic realization of glottalized bilabial voiced stop /~b'/ (nasal context) in morpheme boundary: vowel-initial suffix attached

/~bi-~heb'-ep-b'e/ [mĩ-ɦ̃ɛ̃m-ep-be]

3SG.FEM-eat-PAST-REC.PAST

'She (just) ate'



Note that in Figure 2.17 presented above, the glottalization in the nasalized, morpheme-final glottalized stop is not different from the realization of plain glottalized voiced stop when having a vowel-initial suffix attached.

Although I am not able to show at this point evidence for the occurrence of this nasalized allophone of /b'/ in morpheme-initial position, I have two possible hypotheses about its realization. The first possible way in which nasal allophones of glottalized voiced stops can surface is to be neutralized with the plain voiced stop in nasal environments when it is preceding a vowel (morpheme-initial or morpheme-medially position) just like it is the case illustrated above where the morpheme-final nasal allophone glottalized stop is neutralized when a vowel-initial suffix is attached to the root.

A second possibility of this realization would be to expect the nasal allophone to have an ejective phonetic feature in morpheme-initial position or even as laryngealization on the immediate next or preceding vowel.

The answer to these hypotheses is still to be tested and I commit to soon have a better approach to it.

Although my data still have many gaps, the realization presented here for glottalized voiced bilabial obstruent /b'/ is also expected to hold true for the entire series of glottalized stops.

B. /**d'**/

For this analysis /d'/ is expected to have the same distribution as does its non-glottalized counterpart. Though I do not have yet enough data to provide a well grounded argument about the phonetic realization of /d'/ in the different environments, I hypothesize here that in morpheme-initial position, as is the case for the bilabial glottalized voiced stop /b'/, /d'/ should have a subtle ejective phonetic surface, but more than all, it should have an effect of laryngealization on the vowel immediately following the glottalized phoneme: [C'V̰], as seen in Figure 2.17 (/-b'e/) above. Also, this segment should be expected to have a fully nasalized allophone whenever encountered in nasal contexts.

In final position in oral contexts, /d'/ appears as [ɗ̰] or [t̰], and when in final position of nasal contexts it surfaces as either [n̰] or with a homorganic voiceless consonant [nt].

(72) Note that /d'/ ≠ /d/, and /d'/ ≠ /t/:

/~dû**d'**/	[nûnt̰]	'barbasco (fishing poison)'	/~dŭ**t**/	[nŭt̰]	'pichuna' tree sp.
			/~jŭ**d**/	[ɲŭn]	'chase'
/wû**d'**/	[wûɗ̰]	'electric eel'	/wù**d**/	[wùd^{n}]	'stomach'
			/-wu̯**t**/	[wu̯t̰]	'REP. EVIDENTIAL'
			/~wù**t**/	[wṵ̃t̰]	'name'
/bâ**d'**/	[^{m}bâɗ̰]	'be awake'	/ bă**d**/	[^{m}bădⁿ]	'to dig'

/j’ɨ̀**d’**/ [ʧɨ̀d̰] /j’ɨ̂**d**/ [ʧɨ̂dⁿ] ‘to sit’

/ j’ɨ̀**t**/ [ʧɨ̀t̰] ‘smoke (meat/fish)’

/jà**d’**/ [ⁿʤàd̰] ‘women’ /jà**d**/ [ⁿʤàdⁿ] ‘woman’

/~kǎ**d’**/[kɜ̃n̰]~[kɜ̃nt] ‘3sg.fem’ /~kǎ**d**/ [kɜ̃n] ‘3sg.msc’

Figures 2.18 and 2.19 below illustrate the contrast between nasal allophones /~d’/ and /d/:

Figure 2.18: Phonetic realization of nasal allophone of glottalized voiced alveolar stop /~d’/:
(/~kǎd’/ [kɜ̃nt/kɜ̃n̰] ‘3sg.fem’ pronoun)

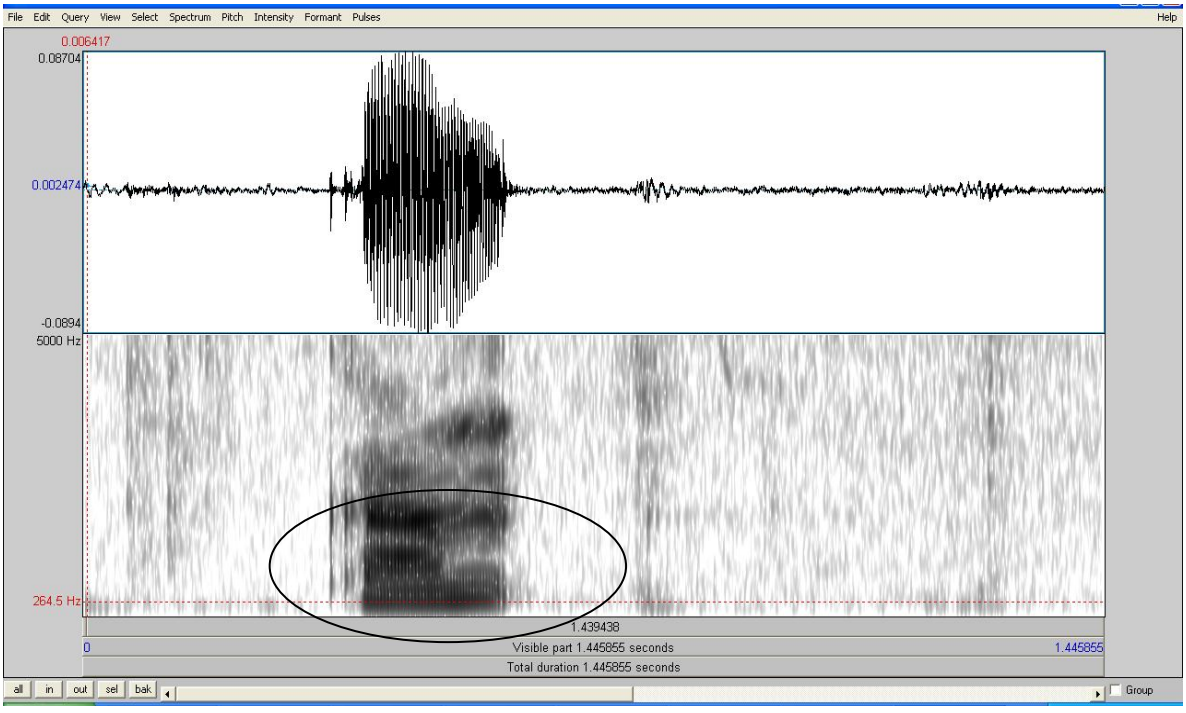
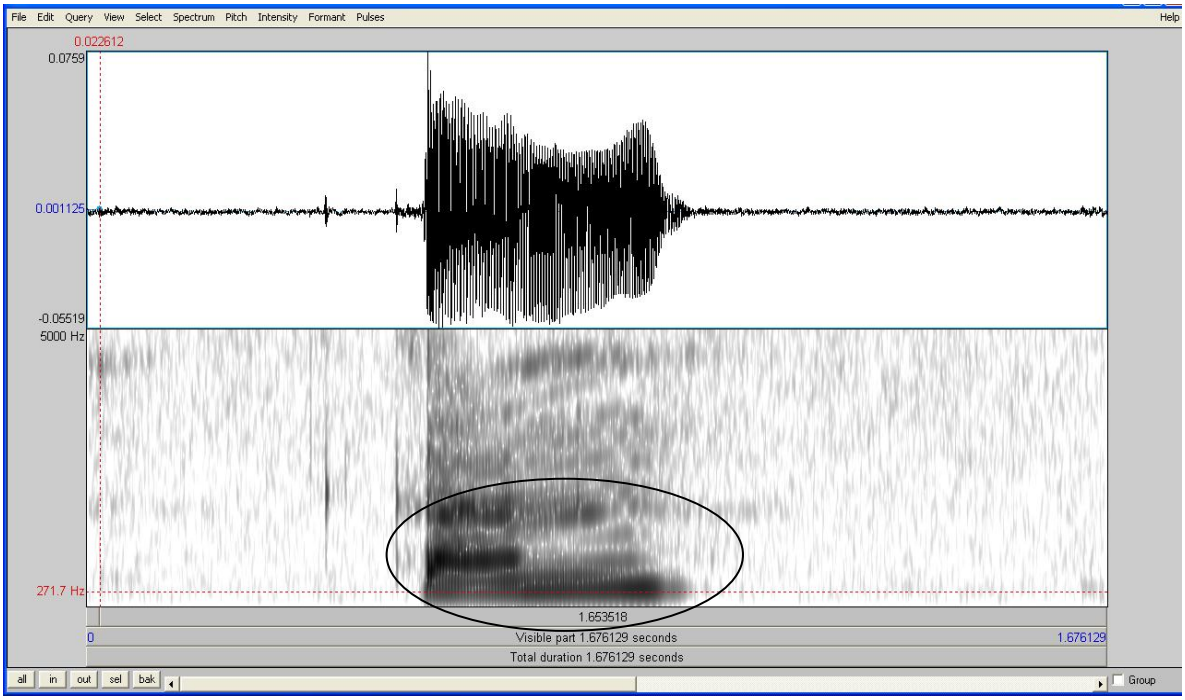


Figure 2.19: Phonetic realization of nasal allophone of plain voiced alveolar stop /~d/:
(/~kăd/ [kã̆n]‘3sg.masc’)



Figures above show minimal pairs distinguishing the phonetic realization and contrastive distribution of /d’/ and /d/.

C. /**g’**/

In morpheme-initial position glottalized voiced velar /g’/ cannot occur, following the restricted distribution pattern of its non-glottalized counterpart /g/.

Evidence for minimal pairs between /g’/ and /g/ is shown in the examples below.

Although the data available do not shows examples illustrating the occurrence of morpheme-internally /g’/, given the distribution of /g’/’s non-glottalized counterpart, it should be expected to have no restrictions on /g’/ in morpheme-internal position.

Morpheme-finally, /g’/ is pronounces as [g̰].

(73) Note that /g’/ ≠ /g/, /g’/ ≠ /k/, and /g’/ ≠ /ʔ/

/pù**g̱'**/	[pù**g̱**]	'make noise clapping on water/drawn'	/pû**g**/	[pû:gⁿ] 'to make soft'
			/~pùʔ/	[pṹʔ] 'sharp end'
			/~bùk/	[mṹk̃] 'men's ceremonial chant'
/jù**g̱'**/	[ⁿdʒù**g̱**]	'to comb'	/jû**g**/	[ⁿdʒûgⁿ] 'part of tree that falls off the tree'
			/jŭ**k**/	[ⁿdʒŭk̃] 'hair/feather'
			/jù**ʔ**/	[ⁿdʒùʔ] 'FRUSTATIVE'

It looks like the glottalized /g'/ have the same behavior as /b'/ in oral contexts.

Although I can only provide for now evidence of the behavior of /g'/ in oral contexts, I predict that in nasal environments /~g'/ also follows the same behavior of nasal contexts described for /b'/. The nasal allophone of /g'/ should be [ŋ̱] and its distribution should also reflect the same restrictions on the distribution of /g'/ in oral environments. Once again, this is hypothesis needs to be tested once more data are available.

In oral contexts, like in the case for /b'/, the glottalized /g'/ is often neutralized with /g/ when /g'/ is followed by a vowel-initial suffix. Compare the phonetic realization of /g'/ in both contexts, when in followed by a consonant-initial suffix and when followed by a vowel-initial suffix:

(74) /pù**g̱'**/ [pù**g̱**] 'make noise clapping on water': Followed by consonant-initial suffix:

/~hâh ~ʔa-t-pù**g̱'**-taga-**~**da-ka/ [ɦ̃ãɦ̃ ʔãt-pù**g̱**-taga-nã-ka]

listen! 3SG.MASC-make.noise.clapping.on.water -INFER.EVIDENT-PRES-?IMPERF?

'Listen! he is drowning' (information inferred)

(75) Followed by a vowel-initial suffix:

/~ʔa-pù**g̱'**-**u̱p**-**~**da-b'e/ [ʔã-pù**g̱**-**u̱**p-nã-b'e]

3SG.MASC-hacer.ruido.con.las.manos-PAST-REC.PAST

‘he drowned’ (speaker saw it)

(76) Compare the behavior of /k/ in morpheme-final position followed by consonant- and vowel-initial suffixes; the contrast between /g’/ and /k/ is maintained (unlike the contrast between /g'/ and /g/ when a vowel-initial suffix follows):

a. /bâk/ [bâk̓] ‘get.out’
/~wa-bâ**k-~da**-ka/ [wa-bâk-na-ka]
1SG-get.out-?PRES?-?IMPERF?
‘I am getting out’

b. /~ba-bâ**k-a**/ [ma-bâk-á]
2SG-get.out-IMPER
‘Get out!’(leave!)

II Glottalized glides

Glottalized glides in Kakua occur with the same distribution as do their non-glottalized counterparts. Both glides /j/ and /w/ have glottalized counterparts /j’/ and /w’/. In morpheme-final position, the phonetic realization of these glottalized glides contains both glide and glottal stop components [Glide?]. In morpheme-internally or across morpheme boundaries when attached a vowel-initial suffix, the glottalization of the glide has a strong laryngealization effect on the following vowel.

This analysis is still preliminary and should not be considered conclusive. At this point many questions remain unanswered.

A. /j’/

In this analysis of Kakua phonology I have included the glottalized palatal glide /j’/ as a segment on its own in spite of the problems that this analysis may have. I present here

the arguments for and against for proposing /j'/ as a phoneme in Kakua's phonemic inventory.

The phonetic realization of /j'/ is [ʧ] in morpheme-initial position and /j'/ in final position.

The analysis of [ʧ] and [jʔ] as allophones of /j'/ is motivated by several considerations. First, these sounds are in complementary distribution. Second, /j'/ should be expected to have a morpheme-initial occurrence following the pattern of its non-glottalized counterpart /j/ that shows a morpheme-initial voiced allophone [^{n}ʤ] as illustrated in 2.1.2.5 B above. Third the phonetic similarity between /j/ and glottalized /j'/ (note /j/ as [^{n}ʤ] and /j'/ as [ʧ]) making them contrastive regardless of the segments in their environment (as shown by the minimal pairs in 77 and 78 below). Note that this phonetic similarity is not found in the set of consonants with restricted distribution (/g/, /f/, and /l/). And finally, given that Kakua does not allow for consonant clusters in its syllabic structure, it is more elegant to propose that in $CVC_{Glide+ʔ}$ syllables, the glottal portion is an autosegmental feature of the glide as (Glideʔ), rather than assuming that in the structure $CVC_{Glide+ʔ}$ both the glide and the glottal are two separate phonemes and having to explain why only in cases involving a glide plus a glottal stop consonant clusters are allowed, while not allowed with any other type of consonant sequences.

The exceptional phonetic behavior of the glottalized palatal can potentially represent a flaw for the argumentation of [ʧ] and [jʔ] as /j'/'s allophonic variations in morpheme-initial and final positions respectively. For this argument against the analysis of /j'/ as a phoneme on its own, is relevant to note that unlike the series of glottalized voiced stops, the glottalized palatal /j'/ does not exert a laryngealization effect on the following vowel when in morpheme-initial position (but only when morpheme-medial or followed by a vowel-initial suffix), or on the preceding vowel (when morpheme-medial or final; this is consistent also with the glottalized voiced stops). After all, from my own experience when analyzing /j'/'s allophonic variations, these are not quite as salient given their exceptional phonetic behavior (different than the laryngealization effect on the surrounding vowels shown in the series of glottalized stops).

Another problem with the analysis that still needs to be attested is that at this point I have not yet found instances of glottalized glide /w'/ in morpheme-initial position which may suggest that /w'/ are in fact restricted to occur in morpheme-initial position in which case it will be plausible to analyze [ʧ] as having a phonemic status with a restricted distribution as it is the case for /f/, /g/, and /l/.

In morpheme-initial position, glottalized /j'/ has a voiceless allophone [ʧ]. Note /j'/ ≠ /j/, and /j'/ ≠ /t/.

(77) /**j'**êw/ [ʧêw] 'to tie' /**j**ěw/ [ⁿʤěw] 'sun'

/**t**èw/ [tèw] 'to work/paly'

/**j'**î/ [ʧî:] 'to fall in drops/leak' /**j**î/ [ⁿʤî] 'grease/fat'

/**t**îb/ [tîbᵐ] 'seed'

/ě**j'**/ [ⁿʤějʔ] 'to poison' /j'ê**j**/ [ʧêj] 'to look up'

/**t**êj'/ [têjʔ] 'hand'

Following the distribution of the non-glottalized palatal /j/, it is expected that glottalized /j'/ will occur also in morpheme-medial position. The data available, nonetheless, are limited and in the only example that I found, /j'/ occurs phonetically in morpheme-medial position but it is actually produced by a compound of two morphemes and its pronunciation often varies across speakers:

(78)

[hìʧa]~[hìj'-ʤ̊a] 'foot'

/hi**j'/ +/j**a/ 'foot' + '?'

It is important to note that this yet undefined morpheme /ja/, here attaching to the root for 'foot', also attaches to the root /tej'/ to form the word 'hand' /tej'/+/ja/. However,

in this later case, the phonetic pronunciation is invariably [tej'-ʤa] and never [tej'ʧa]. This phonetic pattern is not yet understood and I have only recently begun to analyze possible hypotheses that would account for this case. More data are needed in order to propose a satisfactory analysis.

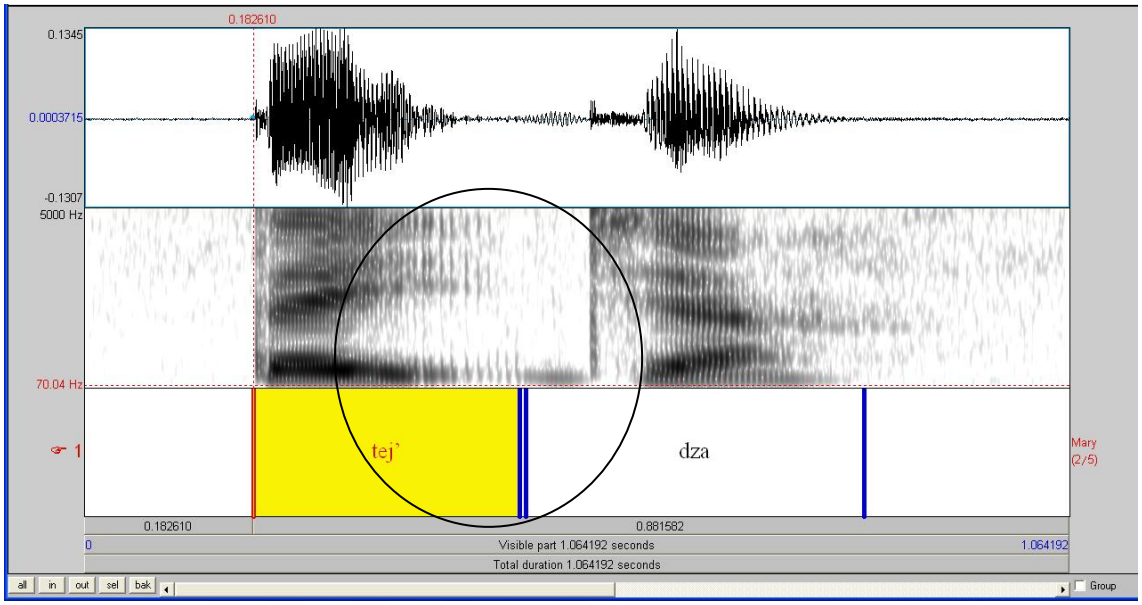
In nasal contexts /j'/ surfaces as its voiceless allophone /ʧ/ in morpheme-initial position, and as [j̃ʔ] morpheme-finally:

(79)	/~jâ**j'**/[ɲãj̃ʔ]	'spoilt/not well knitted'	/~**j**âj/ [ɲãj̃]	'to spread'
	/~**j'**ă**j'**/ [ʧãj̃ʔ]	'ripe avina fruit'	/~j'ă**j**/ [ʧãj̃]	'to pile'

Before a vowel-initial suffix, /j'/ leaves a trace of laryngealization on the following vowel: [jʔ-V̰]. Also, when morpheme-final /j'/ is followed by a consonant-initial morpheme/suffix, the glottalization is reflected on a laryngealization on the pronunciation of the glottal segment itself. See spectrogram below:

(80) /têj'-ja/ [têj'-ʤa̰] 'hand-?')

Figure 2.20. Kakua glottalized glide /j'/ before consonant initial suffix.
(/têj'-ja/ [têj'-ʤa] 'hand-?')



Note laryngealization shown by the spacing of the pulses beginning and following the production of /j’/.

B. /**w’**/

The distribution of /w’/ is predicted to reflect the distribution of its non-glottalized counterpart /w/ (but more data are needed to determine this). The glottal portion of the /w’/ segment has a laryngealization effect on the following vowel, whether followed by a V-initial suffix or in morpheme-medial position: [wV̰]. The glottalized glide /w’/ in morpheme-final position is pronounced as a cluster of [w]+[ʔ]: [wʔ].

In this section I show examples for the contrast between /w’/ and /w/ in morpheme-final position; nonetheless, I do not have available data to show examples of /w’/ in morpheme-initial position. More data are expected to test the occurrence of /w’/ in initial position.

(81) Note /w’/ ≠ /w/

/j’ă**w’**/	[ʧăwʔ] ‘blurry/foggy’	/j’à**w**/	[ʧàw] ‘salir humo’
/j’ê**w’**/	[ʧêwʔ] ‘strong uncomfortable smell’	/j’ê**w**/	[ʧêw] ‘to tie’
/ʔî**w’**/	[ʔîwʔ] ‘beam’		
/hĭ**w’**/	[hĭwʔ] ‘guide rituals/like a chaman’	/hĭ**w**/	[hĭw] ‘jaguar’
/wĭ**w’**/	[wĭwʔ] ‘draw lines to mark territory’	/wĭ**w**/	[wĭw] ‘wasp’

In nasal morphemes, /w’/ undergoes nasalization [w̃ʔ]:

(82) /~hăw’/	[h̃ẵw̃ʔ] ‘to come/return’	/~hâ**w**/	[h̃ã̃w̃] ‘to become covered by vegetation again a portion of the forest or a path that was already cleared’
/~dă**w’**/	[nãw̃ʔ] ‘tell a story’		

/~pâ**w**/ [pɐ̃w̃] ‘semilla del árbol de pan’ /~pâ**w’**/[pɐ̃w̃ʔ] ‘arder la piel’

/~ʔû**w’**/ [ʔṵ̃w̃ʔ] ‘to hide in between’ /~ʔù**w**/ [ʔṵ̃w̃] ‘to sleep’

There are two possible analyses of the phonetic realization of the glottalized glides in morpheme-medial position. Nevertheless, the available data at this point is still limited and no conclusive analysis can yet be proposed. One possible way of analyzing the phonetic realization of glottalized glides, will be to predict the glottalized consonant as having a laryngealization effect on the following vowel as is the case for glottal stops in oral contexts (see Figure 2.15 above illustrating glottal voiced bilabial /b’/ in morpheme-medial position in oral contexts, and Figure 2.20 for the phonetic realization of /j’/ across morpheme-boundary). Another alternative is to expect the glottalized glide /w’/ to be neutralized with /w/ in morpheme-medial position as is the case for the nasal allophones of glottalized stops shown in Figure 2.17 above for the case of /~b’/, as it has been proposed for the case of /g’/ which is also in restricted distribution.

III. Summary of glottalized series

As seen in this subsection on glottalized consonants, Kakua has a set of glottalized voiced obstruents and glottalized glides distinct from the set of plain voiced stops and glides. This series of glottalized consonants do not have contrastive voiceless glottalized counterparts (there are no glottalized voiceless stops). Although the available data for this analysis is limited, it is proposed here that the series of glottalized consonants are expected to occur with the same distribution as the non-glottalized counterparts.

An alternative analysis for the phonetic phenomena of glottalized consonants would be to suggest that these are not one single segment but rather they are underlyingly consonant clusters made up of two segments being /Cʔ/. In nasal contexts the glottal stop would then assimilate as a homorganic voiceless consonant. This analysis, however, is

made less appealing by the fact that no consonant clusters seem to be allowed in Kakua's syllabic and word structure. Therefore, if glottalized consonants were to be considered two separate segments /CʔV/, this set of clusters will not be allowed in morpheme-internal position. Also, this analysis would not predict why the cluster combination is limited to a small set of consonants and not applied to the entire phoneme inventory.

The analysis proposed here favoring a set of glottalized consonants can account for the occurrences of consonant + glottal stop as parts of one same segment when in morpheme-internal position. Although this seems to be an attractive analysis, it must be said that it is not conclusive and it is still subject to exhaustive further study.

IV. Comparative note.

It is very relevant to note that a very similar phonological pattern of glottalized consonants has been proposed for Hup (Epps, 2005, 2008) and Yuhup (Martins 2005, cf. Ospina, 2002) also having very similar phonetic realizations and a wide range of allophonic distinctions. This parallelism is in fact a very interesting from a typological perspective. What makes this especially interesting is the fact that this strikingly similar phonological pattern of glottalized consonants is being displayed by apparently unrelated languages spoken in the same linguistic area. And also, is very interesting the fact that this phonological pattern is not found in the neighboring Tukanoan languages. It is important to note, however, that Epps' (Hup) and Ospina's (Yuhup) analyses differ with regard to glottalized consonants, presenting difficulties to establish how exactly both Hup and Yuhup's glottalized series are phonologically similar or different.

For future research it will be very interesting to analyze whether the glottal feature might be added onto an underlying non-glottalized phoneme in order to derive lexical differentiations as is the case of Kakua's pronouns 3SG.MASC /~kăd/ [kə̃n], and 3SG.FEM /~kădˀ/ [kə̃n̰]~[kə̃nˀ].

Kakua's sister, Nukak, show a much broader gender distinction on pronouns by means of glottalization difference:

(83) Nukak (Mahecha, personal communication):

/~did/ [nin] 'this.MASC' DEMONSTRATIVE

/~did'/ [nin̰] 'this.FEM' DEMONSTRATIVE

From Kakua's bible translations made by the SIL missionary Marilyn Cathcart, it seems that this strategy also occurs in Kakua:

(84) Kakua new testament, San Juan 12, 5 (glossing and translation mine[4])

¿Dépanih tigaá **nint** caan mácdih mi bíbohna y~~u~~hna, mit jíib chãj w~~ũ~~hcan?

Dépani?	*tigaá*	***nint***	*caan*	*mác-di?*
how.come	to.be(emph)	**demonstrative.fem**	3sg.masc	liquid-obj

mi-bíbo?-na-y~~u~~hna	*mi-t-jíib-chãj-w~~ũ~~?-can*
3sg.fem-have-?imperf?-frustative	3sg.fem-non.sens-price/sell-do-give-neg

"Why is it that **this liquid here** was not given by him (Judas)?"

This is something that needs to be examined in further analysis.

2.1.2.8 Phonotactics of consonants

This subsection summarizes the distribution and restrictions on Kakua's consonants.

Unlike neighboring Eastern Tukanoan languages, Kakua presents word-final consonants; in fact, the preferred syllabic structure in Kakua is CVC (see Section 4 for syllable structure). With the exception of Kakua's fricative /f/ and lateral /l/, any

[4] Marilyn Cathcart has proposed an orthographic convention for Kakua, to write glottal stop as *h*, her motivation for this is based on having an orthographic system that can use Spanish characters. In the glosses I give for this example, I have changed *h* for the phonemic representation of glottal phoneme.

consonant in the phonemic inventory can occur in coda position. With the exception of Kakua's voiced velar obstruent /g/ and its glottalized counterpart /g'/, all consonants may occur in onset position. Sequences of consonants within the same morpheme are strongly avoided in Kakua's morphemic structure (see Section 4 for morpheme/word structure).

SECTION 3: SUPRASEGMENTAL PHONOLOGY

The two primary prosodic features in Kakua are contrastive pitch levels and nasalization. These features have phonemic status and occur at the syllabic or morphological level rather than at the segmental level.

This section is organized into two main subsections. Section 3.1 offers a description of the nasalization pattern in Kakua. Section 3.2 describes the word-level prominence, tone system and its realization.

3.1 Nasalization

Nasalization in Kakua is a prosodic property of the morpheme that affects all segments within the morpheme. Every morpheme is specified as either being fully nasal or fully oral. Segments do not contrast the phonemic level for nasality or orality, which cannot be considered properties of individual segments. Nasal morphemes in the phonemic transcriptions of this work are represented with a leading tilde: /~CV(C)/.

As noted above, nasalization affects and spreads throughout all segmental phonemes of the morpheme, with the exception of voiceless obstruents, which are not targets for nasality. Thus, all segmental phonemes in Kakua have both nasal and oral variants depending on the nasal or oral value of the morpheme in which they occur. Thus [m], [n], [ŋ] are all allophones of the voiced stop series /b/, /d/, /g/, and glottalized [m’], [n’], and [ŋ’] are allophones of the glottalized stops /b’/, /d’/, and /g’/. The palatal glide /j/ has a nasal allophone [ɲ], and the fricatives /f/ and /h/ as well as the bilabial glide /w/ are also nasalized in nasal contexts. Also, glottalized glides /w’/, and /j’/ have nasal allophones which vary depending on their position within the morpheme; glottalized palatal glide /j’/ morpheme-initially is realized as a voiceless fricative [ʧ], and it does not undergo nasalization following the pattern for voiceless stops. On the same basis, vowels also undergo nasalization in nasal environments (i.e. in nasal morphemes).

Words can contrast on the basis of nasality or orality, as can be seen in the minimal or near-minimal pairs are presented below:

(85) /hâʔ/ [hâːʔ] ‘domesticated wild animal’
/~hâʔ/ [h̃ãːʔ] ‘too small to fit’

(86) /j’êj/ [ʧêj] ‘to look up’
/~j’êj/ [ʧẽ̃j] ‘cocoon’

(87) /pàb/ [pàbᵐ] ‘cotton’
/~pàb/ [pàm] ‘to sleep together’

(88) /dìd/ [ⁿdìdⁿ] ‘send a message’
/~did/ [nin] ‘DEMONSTRATIVE.this’

(89) /jà/ [ⁿʤàː] ‘walking-stick (insect sp)’
/~jă/ [ɲăː] ‘to soften food/a thing’

(90) /wṵ̃t/ [wṵ̀t̰] ‘demand/reported evidential (affix)’
/~wṵ̀t/[w̃ṵ̃t̰] ‘name’

(91) /ʔèd/ [ʔèdⁿ] ‘fruit sp. (lulo)’
/~ʔèd/ [ʔẽ̃ñ] ‘to see’

(92) /bṵ̆b/ [ᵐbṵ̆b̰] ‘louse’
/~bṵ̂b’/ [m̃ũ̃m̃p̰] ‘to look for lice’

(93) /fìb’/ [fìb̰] ‘to smoke’
/~fṵ̀b/ [f̃ṵ̃m̃] ‘be hard’

In general, nasal spreading does not occur in Kakua, and the cases where it does occur are extremely limited. It does not occur at all across morphemes; thus if a nasal morpheme is compounded with an oral morpheme, the oral morpheme is not affected and does not undergo nasalization.

Vowel-initial suffixes copying the segmental vowel quality of the root, and also copy the prosodic quality. Therefore, if the root is specified for nasalization, then the copied vowel in the suffix also copies the nasalization quality. This should not be assumed as nasal spreading through the suffix, but rather as the suffix copying all the qualities from the root. Consider for example the cases where the past marker is affixed to a nasal morpheme. The form of the past marker is -Vp, where the vowel of the past-marker morpheme copies the features of the vowel of the root to which it is attached:

(94) /~j'àh/ 'do'+ /Vp/ 'past' → /~j'àh-~ap/ 'made/did').

These V-initial suffixes involving vowel copying can be compared to suffixes that do not involve vowel-quality copying. For example, the recent-past suffix /-b'e/ is always oral, and being preceded by a nasal morpheme does not affect the oral realization of this suffix:

(95) /~hěb'/ [hěmp̚] 'eat' + /-b'e/ 'REC.PAST' → [hěmp̚-^{m}b'e] 'just ate'.

(96) /~wùd/ [w̃ũñ] 'be.sick/be.dying' + /-b'e/ 'REC.PAST' → [w̃ũñ-^{m}b'e]
'was (recently)sick'.

The same is true for a number of suffixes like /-diʔ/ 'NON.SUBJECT', /-daʔ/ 'CL.ROUND', /-bŭ/ '?LOCATIVE.SG?', among other oral suffixes:

(97) (/~wěb/ [w̃ẽm] '1SG' + /-diʔ/ [diʔ] 'NON.SUBJECT' → [w̃ẽm-diʔ] '1SG-NON.SUBJ'

(98) /~bàb/ [màm] ‘liver’ + /-daʔ/ [daʔ] ‘CL.ROUND’ → [màm-daʔ] ‘liver’

(99) /~bŭ̃/ [mŭ̃:] ‘house’+/-bŭ/ [ᵐbŭ:] ‘ʔLOCATIVE.SG?’ → [mŭ̃:- ᵐbŭ:] ‘in the house’

(100) ***fĩ̃-bèh****-at-deka*
1PL-go-ʔVERBZLʔ-POT
‘We’ll probably go’

Regressive nasal spreading across morphemes seems also to be highly avoided:

(101) /bàj/ [ᵐbàj] ‘be.small’ + /~di/ [nĩ] ‘adjectivizer’ → [ᵐbàj-ni] ‘(the) small (thing)’

(102) /dub’/ [ⁿdu̬b] ‘CL.long.thin’ + /~daʔ/ [ñãʔ] ‘CL.tree.like’ → [ⁿdu̬b-ñãʔ] ‘grater’

Even in cases where a postnasalized voiced stop or vowel-final morpheme is followed by a nasal suffix, nasal spreading is also avoided:

(103) /bàb-~di hî-~da/ [ᵐbà**bᵐ-nĩ** h**îː-n**ã]
be.white-ʔADJVZʔ strain-ʔPROGRʔ
‘To strain chicha’

Words borrowed from Spanish do present forms combining nasal-oral segments. These words are predominantly personal names:

(104) *andé* ‘Andrés’
nabé ‘Bernabé’
jabón ‘jabón’ (soap)

Examples (78)-(86) above show that nasality and orality in Kakua are, without exception, properties of the morpheme as a whole for native words.

III. Comparative note

The quality of nasality or orality as a suprasegmental property is found to be a phonological feature wide spread among Eastern Tukanoan languages, Kakua's neighboring groups, suggesting that prosodic nasalization in Kakua responds to a Vaupés areal feature.

A phonological sketch of Nukak (Kakua's sister language spoke outside of the Vaupés linguistic area), proposes nasalization as a prosodic feature of the Nukak (Cabrera et al, 1999). In the Kakua's own accounts of their history of migration, the Kakua and Nukak people inhabited the Vaupés territory before splitting. The fact that Nukak also has prosodic nasalization presents two interesting questions to be pursued: one hypothesis would be to propose that prosodic level nasalization was already present in proto Kakua-Nukak. A second hypothesis would be to propose that prosodic nasalization feature in Kakua and Nukak was motivated by areal diffusion, introduced through contact with the Eastern Tukanoan languages in which the nasal feature is also a morpheme-level property. However, at this point of my analysis, I do not report nasalization spreading in Kakua which is, from a typological view, a significant difference with the nasalization pattern in the Tukanoan languages spoken in the Vaupés.

It could also be the case that prosodic nasalization in Kakua and Nukak was already in place in the proto language before their contact with Tukanoan languages. However, the fact that nasalization in these languages is so similar to what is found in many other of the Vaupés languages makes it highly likely that this phonological feature responds to an areal pattern. If so, it would also be very interesting to determine whether prosodic nasalization affected Kakua and Nukak before their splitting or independently after the splitting.

Epps (2005:76-77) discusses the possibility that prosodic nasalization has developed in Hup through contact with Tukano, suggested by absence of nasalization as a suprasegmental feature in Dâw and Nadëb (Hup's sister languages spoken outside of the Vaupés area and in little contact with Tukano).

3.2 Word Prominence and Tone

Kakua presents a word-level prominence whereby the first high syllable closest to the right edge of the word is assigned more prominence. This functions as an intonation pattern to demarcate word boundaries. Syllabic prominence is not contrastive and for that reason I have chosen to analyze Kakua as a tonal language without contrastive interaction with a stress pattern.

Kakua presents a system of contrastive lexical tones. Tone, as will be described in this section, is a suprasegmental property associated with a root. All roots must be specified for tone. Affixes, on the other hand, are divided into toneless and tone-bearing affixes (see below for description in 3.2.2 for the tonal pattern in root and affixes).

This section describes Kakua's word prominence (3.2.1) and tone system (3.2.2).

3.2.1 Word Prominence

At this point in the study I am assuming Kakua to be a purely tonal language. I have chosen to describe Kakua's word-level prominence as a demarcative intonation function rather than analyzing it as a stress system. Many questions about this prominence pattern remain unanswered and for now I will undertake a very sketchy description of this word-level prominence pattern. The motivation for not analyzing Kakua's word-level prominence as a stress system is that prominence is not a contrastive pattern, and its main function seems to be responding to a demarcative intonation system.

The Kakua word-level prominence pattern assigns a primary prominence to the first syllable that at the left-most edge bears the highest pitch in the phonological word. A weak secondary word-level prominence assigns a high pitch to the right-most edge of the clause-final word, marking the clause boundary.

The Kakua phonological word is typically composed by at least one content morpheme and a very flexible number of other function morphemes. The verb structure, for example, is usually expressed as a single grammatical word composed of multiple bound morphemes. The verb word minimally includes one (verb)root and boundary-delimiting affixes at both ends (a proclitic prefix and suffixes marking TAM); maximally, it can include a multiple number of roots (up to five roots) and other formatives:

Verb template:

[Prefix – **'Root** – (Root) – (Root) – (Root) – (TAM suffix) – (TAM Suffix) – (TAM Suffix) –**TAM Suffix]**

As mentioned in the introduction to this section, function morphemes are transparent to word-level prominence; thus, in the verb template shown above, only the verb root will take a prominent intonation while the prefix will associate with the tonal pitch of the verb root. The intonation prominence drifts down towards the end of the phonological word. The suffix at the boundary of the phonological word is assigned with a high pitch (not lexically contrastive) to demark clause boundary.

Example (105) below illustrates a case of a phonological word composed of more than one content word. Only the content morpheme at the left-most edge of the phonological word receives the word-level prominence.

(105) /***~kăd'***~*bi*-***~hŭj-hŭj***-~*da*-*ka*/

3SG.FEM 3SG.FEM-cry-arrive.here-?PROG?-PRES

'She comes (arrives.here) crying'

Note the intonation rhythm in the following figure. The melody drifts down towards the end of the word, and it concludes with a high pitch demarcating clause boundary. The intonation rhythm is signaled with a light-blue line above the phonological words and a

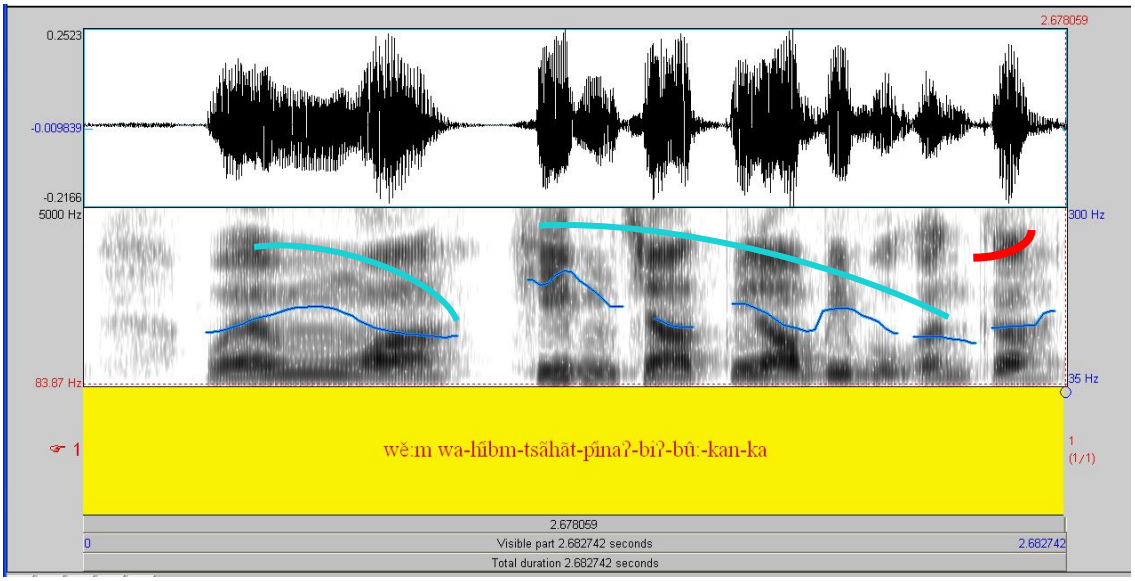
red line illustrates the high-pitch boundary marking. The darker blue line is showing pitch levels:

Figure 3.1 Word-level prominence rhythm in the phonological word.

[**wĕ:m** wa-**hîbm-ʧ̃ãhãb-pînaʔ-biʔ-bû**:-kan-ka]

1SG 1SG-price-do-?to/goal?-other-?to?-NEG-PRES

'I do not have money to buy/expend'



As said above, the analysis of Kakua's prominence/intonation pattern is still problematic at this point and not fully understood. Future analysis is encouraged to determine, for example, whether or not prominence responds to a metrical/stress system or if Kakua is in fact a purely tonal language with no dependency of tone upon stress.

In general, however, an adventurous preliminary generalization that can be posited is that Kakua has a rhythmic prominence-related intonational melody, where the left-most syllable with the highest pitch receives the prominence peak.

3.2.2 Tone

Although contrastive lexical tone seems to be a phonological feature shared by a good number of languages along the Vaupés River from Brazil into Peru (Aikhenvald & Dixon, 1999:10), the typology of tonal systems of Amazonian languages has only recently begun to be explored. Hyman (2010) has looked at correlations between tone, metrical stress, syllable structure, coda voicing, and laryngealization in a number of Amazonian languages and suggests that it is possible to think that the development of tone in at least some South American languages is relatively recent (Hyman 2010:7).

Previous studies of the tonal system of Kakua are limited to Cathcart's (1979) manuscript and Hyman's two page interpretation of this manuscript (Hyman n.d.). In Cathcart (1979) the tonal system of Kakua is described as a 4-way tonal inventory distinguishing between /H/, /L/, /HL/, and /LH/. Based on the data in hand, I propose that Kakua displays a tonal inventory of 3 contrastive phonological tones realized as LH [rising] (/LH/ [LH]), HL [falling] (/HL/ [HL]), and L [low] (/L/ [L]).

The analysis presented in this section is still in progress and should be taken as limited and very preliminary.

I have chosen to orthographically represent Kakua's three phonological tones with diacritics above the vowel in which the high portion of tone is realized (as it has been used throughout the text of this work. The realization of tone is discussed at more length in the present section). The three tones are represented as follow: LH [rising] tone with a caron [ˇ]; HL [falling] tone is represented with a circumflex accent [ˆ]; and L [low] tone with a grave diacritic [ˋ]. Note that even though tone is marked above one specific segment (the vowel), it should be understood as a prosodic feature associated with the entire root.

(106) Contrastive tones in Kakua in words with identical segments: monosyllabic words

/L/:	/^{L} ~ba/	[mɐ̃ɐ̃ˋ:]	'dig out dirt and leave it by the side of where the hole is'
/HL/:	/^{HL} ~ba/	[mɐ̃ɐ̃ˆ:]	'be.old/wood'

/LH/: /^{LH} ~ba/ [m̃ǎ:] ‘leader’

In bisyllabic roots, falling tones is manifested on the first syllable of a bisyllabic word, and rising tone on the second (see description of the manifestation of tone below).

(107) Contrastive tones in Kakua in words with identical segments: bisyllabic words

/L/: /^{L} fugu/ [fùgù] ‘be.melting’

/HL/: /^{HL} fugu/ [fûgù] ‘be.melting’

/LH/: /^{LH} ~dujup/ [nùɲŭp̀] ‘animal’

Tonal contrasts are not restricted to particular word-classes, and all the different tone levels can be found in both noun and verb roots:

(108) Contrastive tones: nouns

/^{HL} ~bej/ [m̃ẽj̃] ‘prints’

/^{LH} ~bej/ [m̃ěj̃] ‘fish trap’

/^{L} ~buh/ [m̄ŭh̃] ‘river/arm’

(109) Contrastive tones: verbs

/^{HL} hud/ [hûdⁿ] ‘to surround (in a circle)’

/^{LH} hud/ [hŭdⁿ] ‘teach bad habits’

/^{L} ~hud’/ [hùnt̀] ‘defecate’

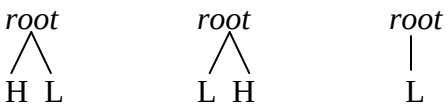
Some affixes are inherently toneless, phonetically deriving their tone from the tone of the root to which they are attached. This group of toneless affixes is composed of proclitic prefixes, TAM markers, and vowel-initial affixes that copy the vowel of the root to which they attached. Other affixes do bear tonal distinctions. Some of these are classifiers and affixes that are derived from lexical roots and have a clear etymological origin. For others their origin is not clear. There is at least one V-initial suffix that bears

tone (possessive -*ǐʔ*). Toneless affixes occur at the word boundaries. Accordingly, tone-bearing affixes are closer to the root and less likely to be toneless.

Tonal contrasts are then equipollent for the root/lexical level (contrasting the three tonal levels HL vs. LH vs. L), and tone is *privative* on the surface level where affixes do not bear specific underlying tones: Tone (=roots/words and some affixes) vs. No-tone (ø=affixes).

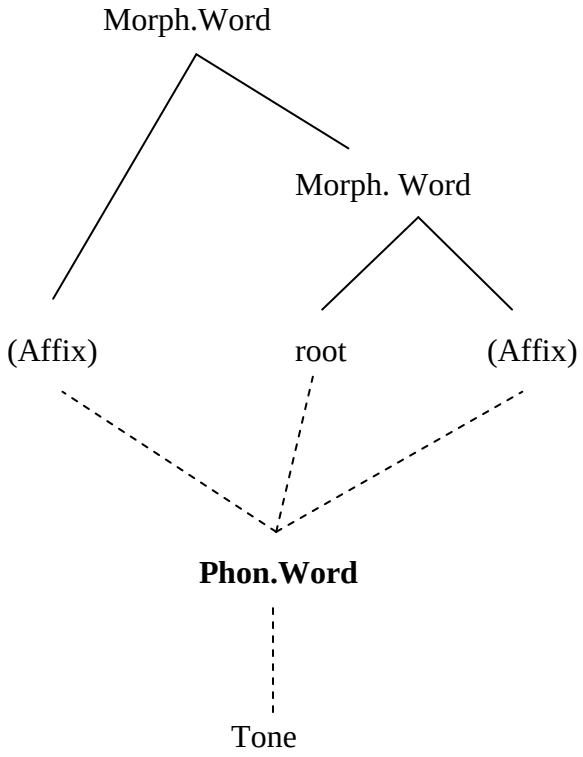
Tone is a suprasegmental property associated with the entire root (root as the tonal domain). Every root must be lexically specified for tone. No combination of tone is allowed; therefore, every root-bearing tone accommodates one, and only one, tone (but see the exceptional case at the end of this section). This distributional restriction of contrastive tones predicts that roots are specified for either entirely *low* tone (L), entirely *rising* (LH) or entirely *falling* (HL):

Figure 3.2: HL, LH, and L tones in the root as the tone domain



An alternative possible analysis is to propose that tone is associated with the root (including the set of tone-bearing affixes and classifiers) but the tone domain is the phonological word. A (not compound) phonological word is consists of one root plus affixes. Figure 3.3 below represents a one-root phonological word as the tone domain:

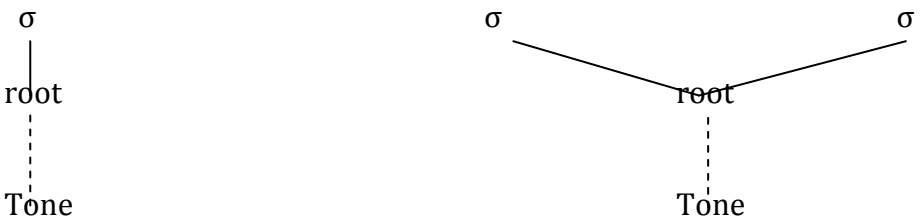
Figure 3.3 Phonological word as the tone domain



The structure above will predict that a phonological word has one and only one tone. However, such a structure demands a metrical analysis able to account for the tonal representation in words conformed by compound morphemes. Because the analysis of Kakua is as yet very preliminary, I do not have satisfactory way to propose the criteria on how group phonological words in a compounded chain of roots. For this reason I will rather analyze for now the root as the tonal domain.

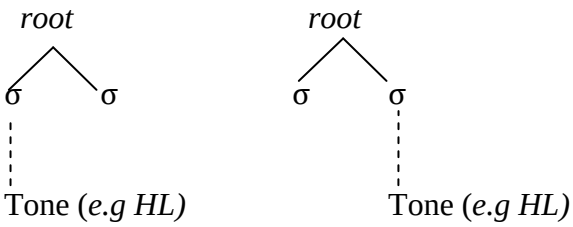
In Kakua roots have at least one and no more than two syllables. Considering the root as the tone unit domain accurately accounts for the occurrence of the three contrastive tones in both mono- and bisyllabic roots. Figure 3.4 illustrates the root as the tonal domain accounting for mono- and bisyllabic roots:

Figure 3.4: Root as the tone domain.



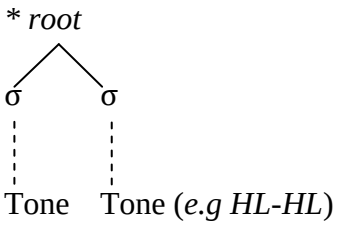
If the domain of tone was to be considered a smaller structure (i.e. syllable or mora), bisyllabic or polimoraic roots will be ambiguously assigned by tone. Compare Figure 3.4 above with Figure 3.5 and Figure 3.6 below:

Figure 3.5: ambiguous tone domain unit: the syllable



Furthermore, by considering the syllable as the unit domain of tone does not restrict for the occurrence of sequences of tone contrasts within the same root. Such sequences, in fact, do not occur in the language (see exceptional cases at the end of this section):

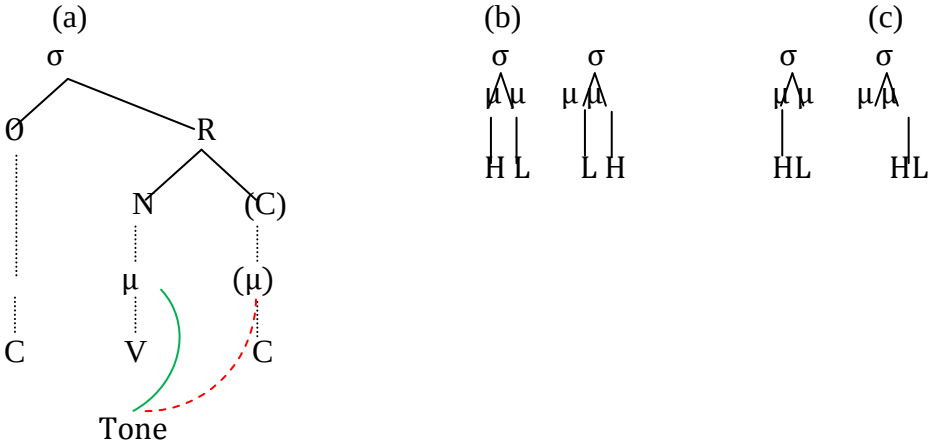
Figure 3.6: Sequences of tonal contrasts within the same root



If the domain of tone were to be considered the mora, it will also create ambiguous representations of tone. In cases in which the coda consonant holds a mora (i.e voiced coda consonant), the representation of tone with the mora as the tonal domain will be

ambiguous, because it does not predict to which mora should the tone be assigned and thus, any of the structures in Figure 3.7 below will be possible:

Figure 3.7: Ambiguous tone domain: the mora



The low tone (L) and both of the contour tones (HL and LH) are realized in both mono- and bisyllabic roots. The phonetic realization of contour tones is at first somehow misleading on how it should be analyzed. This was especially intriguing for me during the time of my analysis. Bisyllabic roots with contour tones are phonetically realized as H-L, or L-H. However, accepting this as the phonemic tonal contrast for bisyllabic roots creates a more complex and more restricted tonal system in which monosyllabic roots will behave differently than bisyllabic ones. The above analysis would not account for the fact that H and L pitches occur only in bisyllabic roots and not in monosyllabic ones.

The way I propose to account for this phonetic realization of contour tones in bisyllabic roots is to assume the root as the domain of tone, where in the presence of contour tones the contour is accommodated on the syllable receiving the highest peak of the contour, while the other syllable will hold the low pitch of the contour. So, a HL [falling] tone is typically accommodated on the first portion of the root and drifts down towards the end of the root, being audibly perceived as a HL-L melody. Likewise, in the presence of a LH [rising] tonal root, the lowest peak of the LH contour is accommodated on the first portion of the root gradually rising towards the end of the root where the highest peak occurs:

(110) Morpheme level tonal distinction

/LH/	/LH hewe/	[hèwě]‘a moving unspecified entity’
/HL/	/ HL hewe/	[hêwè]‘be.open’
/L/	/ L hewe/	[hèwè]‘a clear in the forest’

Root structure as the domain for tone makes an apparently correct prediction: if monosyllabic roots do not allow for more than one tone or tone sequences, then it makes sense to propose that bisyllabic roots do not allow for more than one tone either. Moreover, this analysis elegantly accounts for the surface realization of contour melodies in bisyllabic and monosyllabic roots.

An illustration of the behavior of Kakua’s phonological tone distinctions is given in the subsections below.

3.2.2.1 HL contour tone

HL [falling] tone is phonetically salient, with a drastic downdrift on the pitch level. Its realization starts with a high peak pitch that falls into a low pitch, uninterruptedly passing through intermediate levels. As stated above, sequences of tones are not permitted and thus, HL pitch does not combine with any other tone within the same morpheme. HL is not restricted to a particular root, syllable or moraic structure and it may virtually occur in any environment.

(111) HL contour tone in roots involving open syllables:

a)	/ HL j’a/	[ʧâ:]	‘flower’
	/ HL ha/	[hâ:]	‘to rise or wake up’
	/ HL ~be/	[mẽ:]	‘to warm the body next to a fireplace or in the sun’
	/ HL la/	[lâ:]	‘times (e.g *three times*)’
	/ HL de/	[dê:]	‘alike/relative’
	/ HL ʔu/	[ʔû:]	‘bitter’

/ HL ~tʉ/ [tʉ̃ː] ‘fire wood’

b) / HL hewe/ [hêwè]‘be.open’
/ HL dawa/ [dâwà]‘rubber tree’
/ HL fʉgʉ/ [fʉ̂gʉ̀] ‘drag soil to the bottom of the river by the force of water’

(112) HL contour tone in roots involving closed syllables:

a) / HL ~j’ʉj/ [ʧʉ̃j̃] ‘to step’
/ HL ~bew/ [mêw̃] ‘prints’
/ HL j’aʔ/ [ʧâʔ] ‘to blossom’ (restricted for flowers of an entire tree)
/ HL fib’/ [fîbʔ] ‘to smoke’
/ HL hap/ [hâp̚] ‘young/new’
/ HL hʉd/ [hʉ̂dⁿ] ‘surround’
/ HL ʔiw’/ [ʔîwʔ] ‘cane or stick to hold something up’
/ HL ~baj’/ [mâjʔ] ‘be drunk’

b) / HL hagap/ [hâgàp̚] ‘spider’
/ HL ~pejep/ [~pɛ̃ɲɛ̌p̚] ‘clay pot’
/ HL bakaʔ/ [ᵐbâkàʔ] ‘body’
/ HL ~higaʔ/ [hı̃ı̃ŋ̀ã̌ʔ] ‘be.sad’

The following spectrograms illustrate minimal pairs of HL tone in open (Figure 3.8) and closed syllables (Figure 3.9) and finally both words are shown in context where both occur (Figure 3.10).

Figure 3.8. HL tone in an open syllable /CV/ [CV:]. (/HL j'a/ [ʧâ:] 'flower')

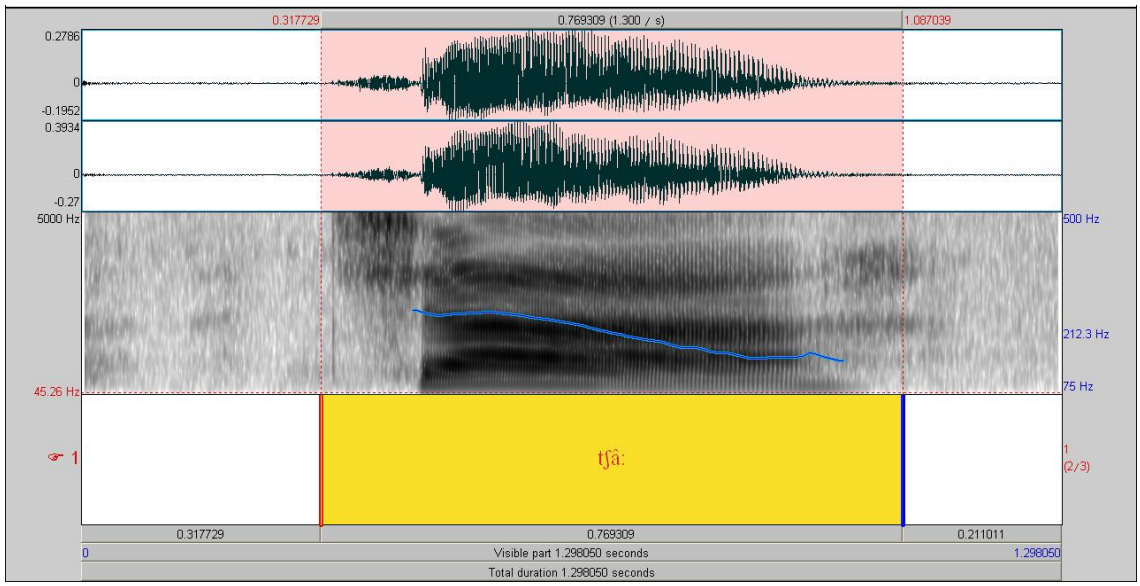


Figure 3.9 Falling tone CVCvoiceless syllable. (/HL j'aʔ/ [ʧâʔ] 'to blossom')

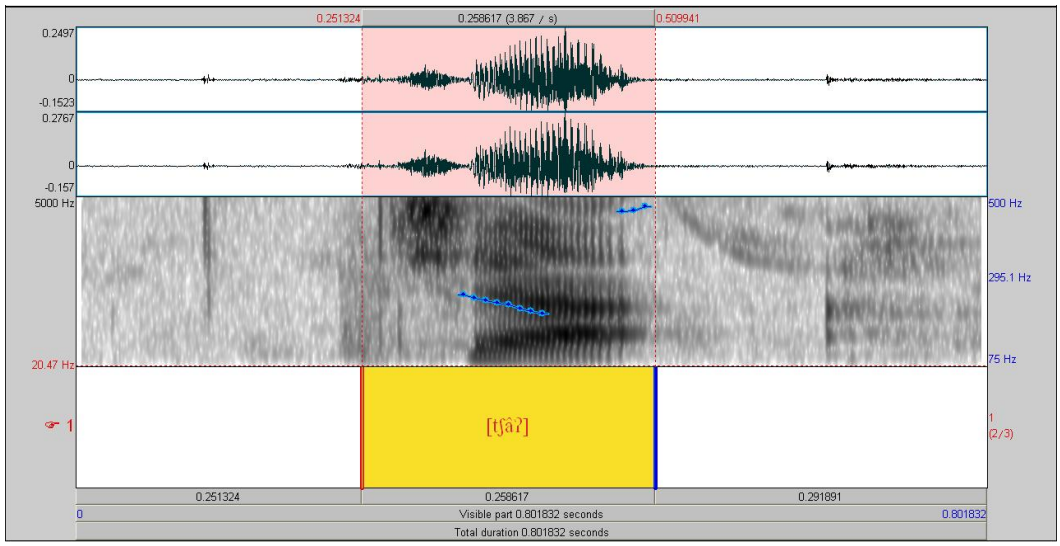
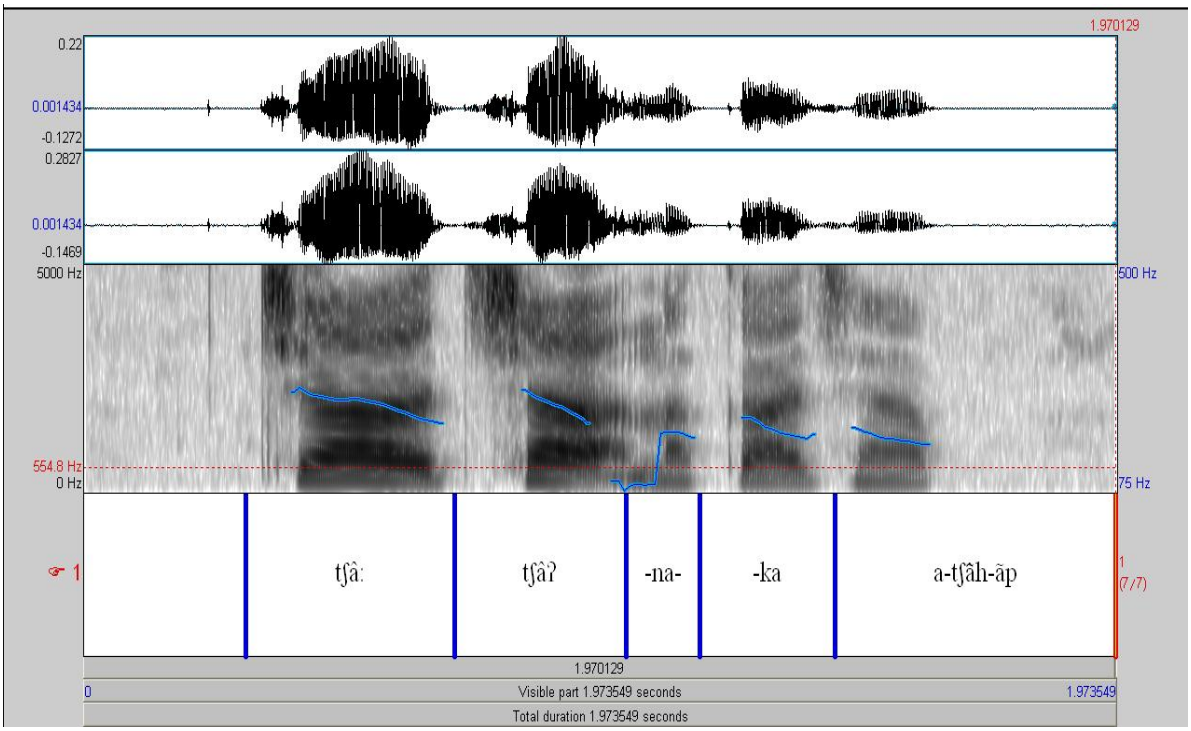


Figure 3.10. Falling tone. Co-occurrence of falling-tone roots with open and closed syllables.

/ HL j'a HL j'aʔ-na-ka- HL ~j'ah-ap/ [***ʧâ ʧâʔ-****na-ka-*ʧɐ̃h-ãp]

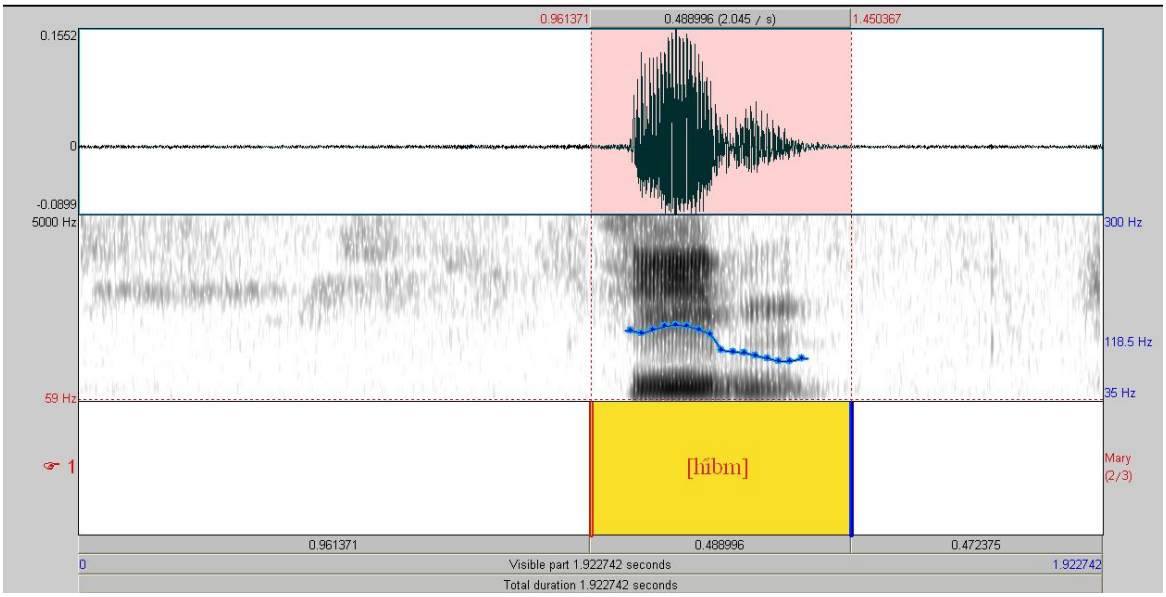
flower blossom-PROG-PRES-do.repeatedly-?

'The flowers are blossoming' (the flowers of an entire tree)



Voiced consonants usually accommodate part of the contour tone. Figure 3.11 below illustrates HL tone in a CVCvoiced syllable.

Figure 3.11 HL tone in CVCvoiced syllable (/HL hib/ [hîbᵐ]
'price/consequence/vengeance'



Note how in Figure 3.11 above the lowest pitch of the HL contour is almost completely accommodated on the coda voiced stop, perceptually subject to analysis as a sequence of a high and a low tone. Nonetheless, since HL contour occurs in open syllables CV (see Figure 3.8) as well as in closed syllables CVCvoiceless (See Figure 3.9), it would be less economical to propose that only in CVCvoiced syllables a H-L distinction occurs. Therefore, it is analyzed here that in CVCvoiced syllabic structures the tone pattern remains the same as that accounted for in other type of structures.

3.2.2.2 LH Tone

LH [rising] tone is characterized by an increase in pitch, starting from a low pitch and gradually rising to a high one, uninterruptedly passing through intermediate levels.

As illustrated for HL tone, the rising LH tone is not restricted to a particular syllable or root structure, and as the examples below show, LH occurs in root with open CV [CV:] and closed syllables.

Table 3.1a. LH and HL minimal pairs in monosyllabic roots involving open syllables:

LH			HL		
/LH ~ba/	[mă:]	'chief'	/HL ~ba/	[mâ:]	'tree/wood/be.old'
/LH hi/	[hĭ:]	'to shine'	/HL hi/	[hî:]	'son in law/strain'
/LH je/	[ⁿʤĕ:]	'avina'(fruit sp)	/HL je/	[ⁿʤê:]	'fish sp'
/LH j'ʉ/	[ʧʉ̆:]	'be.tired'	/HL j'ʉ/	[ʧʉ̂:]	'pineapple'

Table 3.1b. LH and HL minimal pairs in bisyllabic roots involving open syllables:

LH			HL		
/LH hewe/	[hèwĕ]	'a moving entity'	/HL hewe/	[hêwè]	'be.open'
/LH dawa/	[dàwă]	'a lot(quantity)'	/HL dawa/	[dâwà]	'rubber tree'

Figure 3.12 and Figure 3.13 below, illustrate a minimal pair contrast for [rising] and [falling] tones in roots with open syllables. Figure 3.14 shows these minimal tone pairs co-occurring.

Figure 3.12 Rising tone in open syllable

/ LH ~ba/ [mɜ̃:] ‘chief’

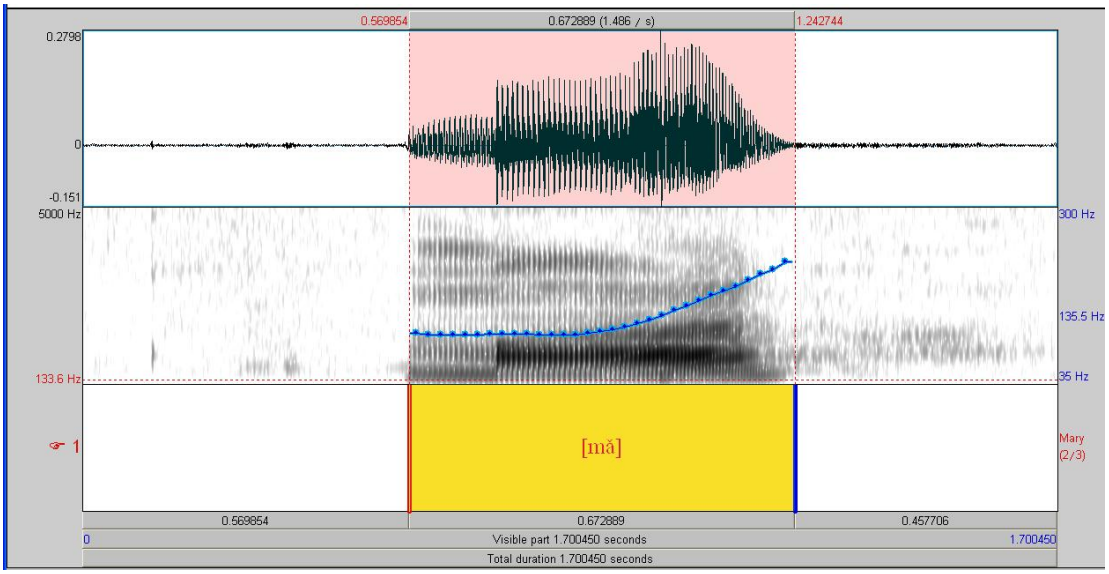


Figure 3.13 Falling tone in open syllable.

/ HL ~ba/ [mɜ̃:] ‘tree/wood/be.old’

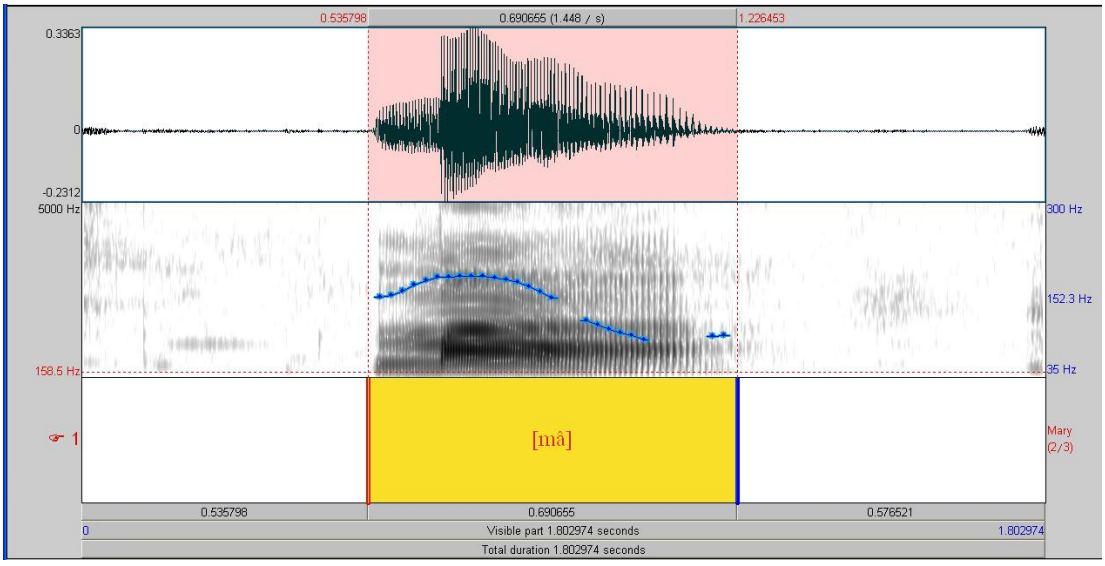
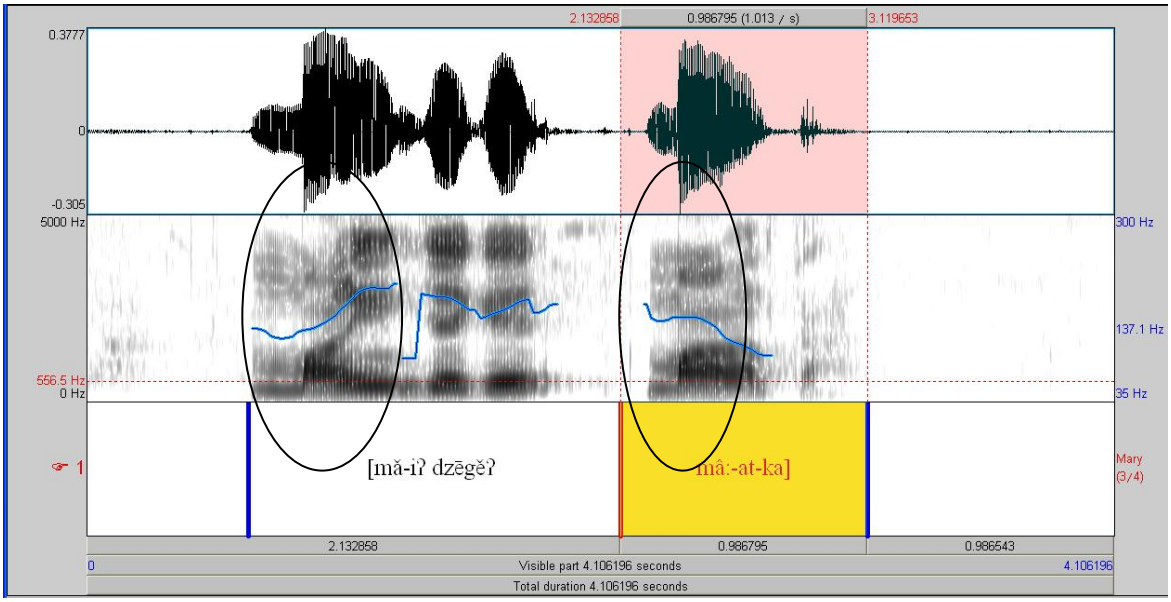


Figure 3.14 Rising and falling tone in context.

/ LH ***~ba-ǐʔ*** LH *jegeʔ* HL ***~ba-at-ka/*** [**mǎ**-íʔ ⁿdʒègěʔ **mâ:-**at-ka]

chief-poss clothes **be.old**-ʔVERBZʔ-PRES

'The chief's clothes are old'



Contour tones in morphemes involving closed syllables are shown in the examples below:

Table 3.2a. LH and HL minimal or near minimal pairs in monosyllabic roots involving closed syllables

LH	HL
/LH haʔ/ [hǎʔ] 'hole left by a fallen tree'	/HL haʔ/ [hâʔ]'domesticated wild animal'
/LH ~heb'/ [hěmp̀]'eat'	/HL hem/ [hêm]'bird sp' (gallito de roca)
/LH j'aʔ/ [ʧǎʔ] 'long.thin.pointed leaves'	/HL j'aʔ/ [ʧâʔ] 'to.blossom'

Table 3.2b. LH and HL minimal or near minimal pairs in bisyllabic roots involving closed syllables

LH	HL
/LH ~dʉjʉp/ [nɐ̃ŋɐ̃ʔ̆] ‘animal’	
/LH hagap/ [hàgăʔ̆]‘arbor’	/HL hagap/ [hâgàʔ̆] ‘spider’
/LH jegeʔ/ [ⁿʤègěʔ] ‘clothes’	

Figure 3.15 and Figure 3.16 below illustrates the pitch track of the two minimal pairs LH vs. HL.

Figure 3.15 LH tone, closed syllable

/LH haʔ/ [hă:ʔ] ‘a hole dug or left by a fallen tree’

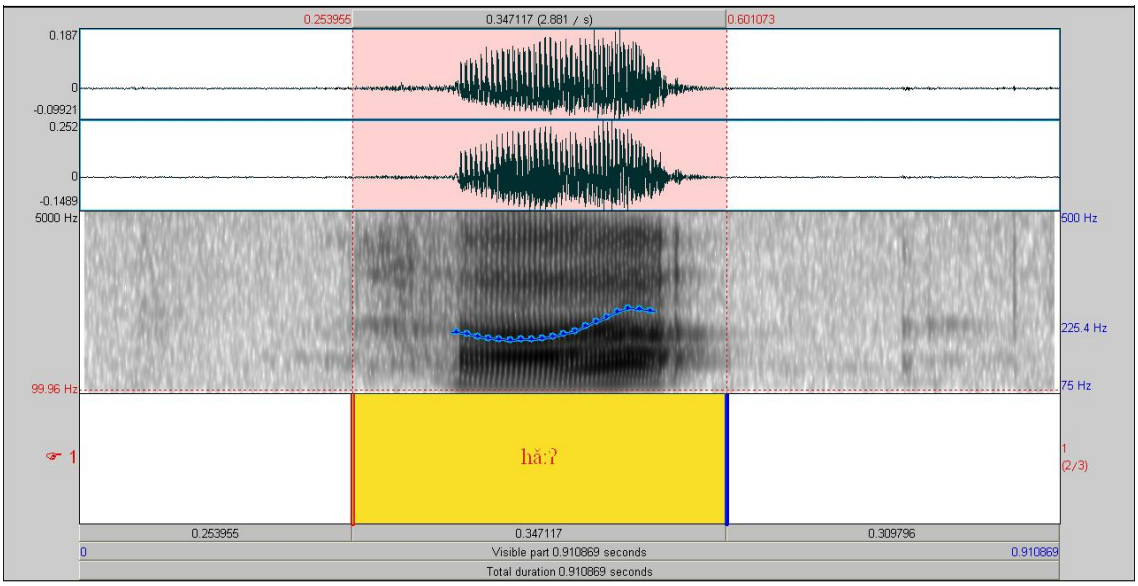
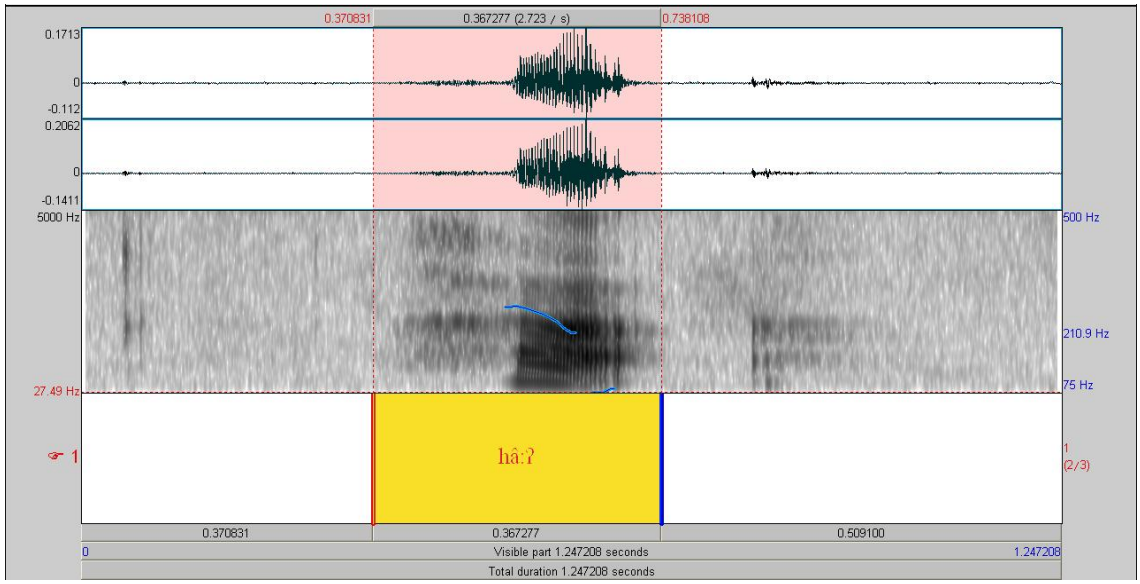


Figure 3.16 HL tone, closed syllable

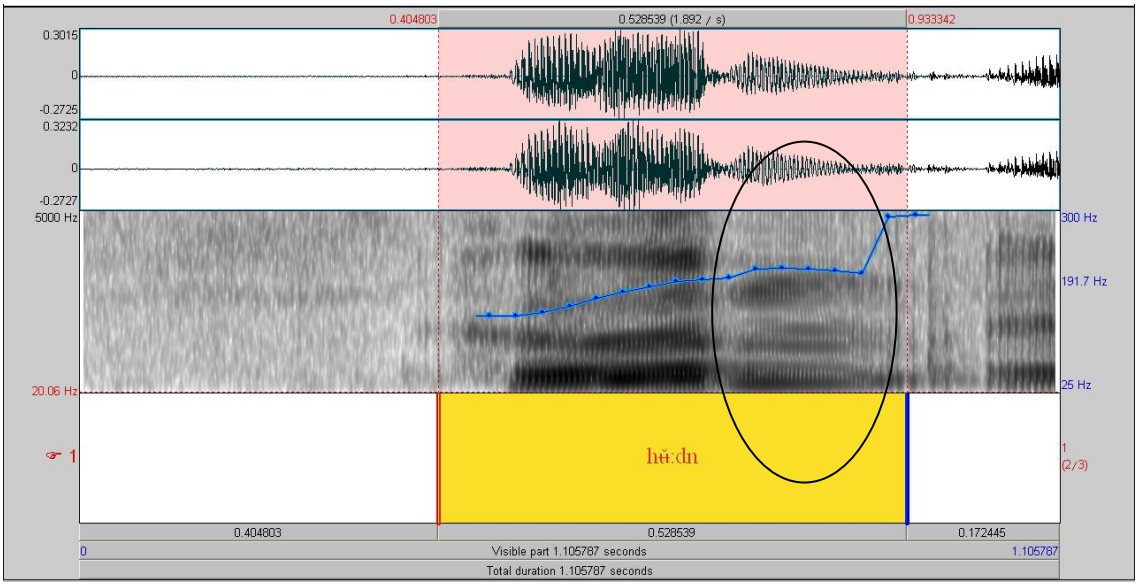
/ HL haʔ/ [hâʔ] ‘domesticated forest animal’.



As is the case of HL tone, a voiced consonant in coda position will typically accommodate part of the LH tone. Figure 3.17 below illustrates this case where the postnasalized portion of voiced consonant holds part of the highest peak of the LH contour tone.

Figure 3.17 LH tone in closed syllable with post-nasalization

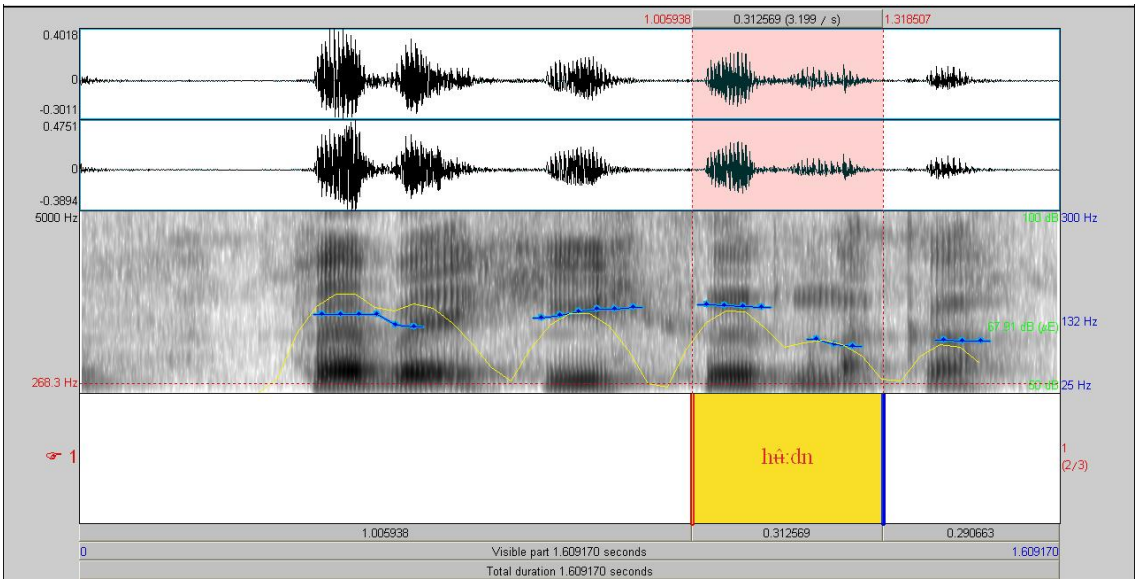
/ LH hʉdn/ [hʉ̆:dn] ‘to teach wrong; teach bad habits’



In Figure 3.17 above, the portion circled stresses the realization of LH tone where the highest portion is still sustained during the nasal portion of the post-nasalized voiced consonant. Compare Figure 3.17 above with the falling HL in Figure 3.18 below where the nasalized portion of the post-nasalized voiced stop is accommodating the lowest portion of the HL contour.

Figure 3.18 HL tone in closed syllable with post-nasalization

/ HL hʉdn/ [hʉ̂ːdn] ‘surround, circle’



3.2.2.3. L(ow) tone

The third tonal distinction of Kakua’s phonological tone system is the low tone, characterized by its sustained low pitch throughout the morpheme. Low tone is phonologically active and as stated above in the description of Kakua’s tonal system, the tonal distinctions are equipollent. The evidence for this is that those roots with lexical low tone have always a low-pitch target, even when occurring in the environment of contiguous roots having other tone distinctions, leaving no asymmetry between the three tones in their phonological behavior. Low tone is present in both the underlying and the surface realizations. Therefore, roots bearing lexical low tone are not associated with zero or no-tone Ø. Roots lexically specified for low tone show contrastive minimal pairs or triplets with HL and/or LH contours:

Table 3.3. Low tone: minimal and near-minimal pairs/triplets:

L	HL	LH
/ᴸ ~ba/ [mɜ̃ː] ‘dig out dirt leaving it by the side’	/ᴴᴸ ~ba/ [mɜ̃ː] ‘tree/be.old’	/ᴸᴴ ~ba/ [mɜ̃ː] ‘chief’
/ᴸj’uh/ [ʧùh] ‘to splash’	/ᴴᴸ j’uj/ [ʧûj] ‘salt/plant sp.’	/ᴸᴴ j’uh/ [ʧŭh] ‘corner’
/ᴸdi/ [dìː] ‘sugar cane’	/ᴴᴸ di/ [dîː] ‘crawl’	
/ᴸhib/ [hìbᵐ] ‘go on a trip’	/ᴴᴸ hib/ [hîbᵐ] ‘consequence/vengeance’	
/ᴸ hiʔ/ [hìʔ] ‘be.bitter’		/ᴸᴴ hiʔ/ [hĭʔ] ‘coati’
/ᴸ pʉd/ [pùdⁿ] ‘lift off a tree from the root’	/ᴴᴸ pʉd/ [pûdⁿ] ‘twist/turn’	/ᴸᴴ pʉb/ [pŭbᵐ] ‘boil in water’

Figure 3.19, Figure 3.20, and Figure 3.21 below are shown to illustrate tonal contrasts among a minimal triplet involving identical segments:

Figure 3.19 The phonetic behavior of low tone. Its mean pitch is 117Hz, its minimum pitch 100Hz and its maximum pitch is 120HZ:

/ L ~ba/[mã:] ‘dig out dirt leaving it by the side of where the hole is’

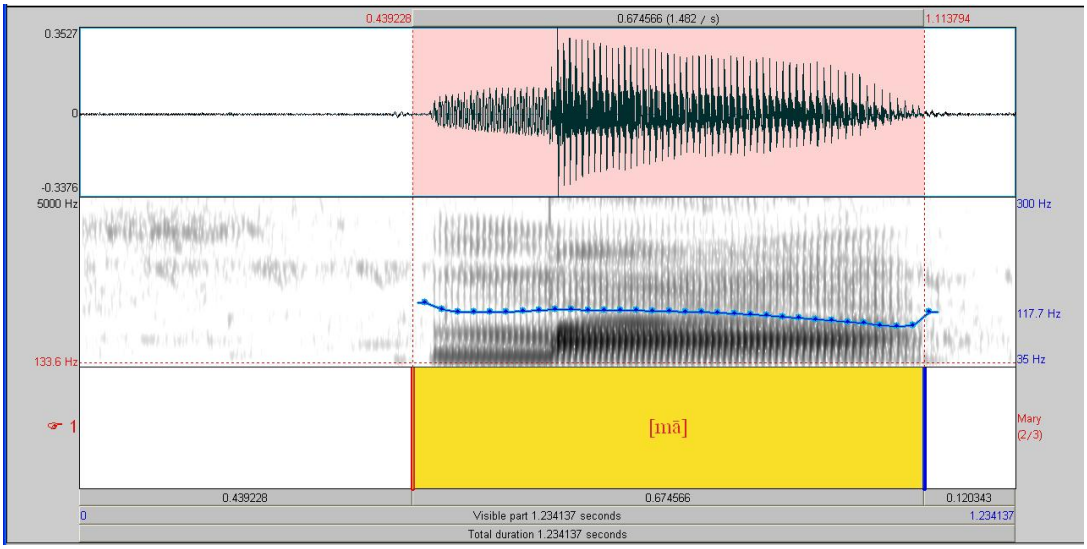


Figure *3.20* The phonetic behavior of LH [rising] tone. Its mean pitch is 143Hz, its minimum pitch is 102Hz and its maximum pitch is 220HZ: / LH ~ba/ [mǎ:] ‘chief’

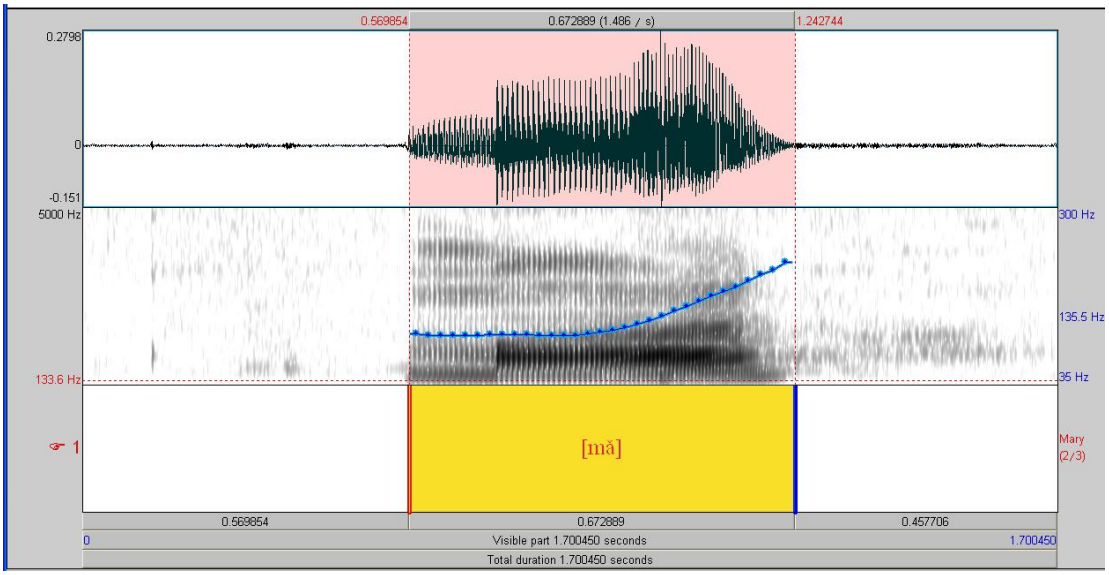
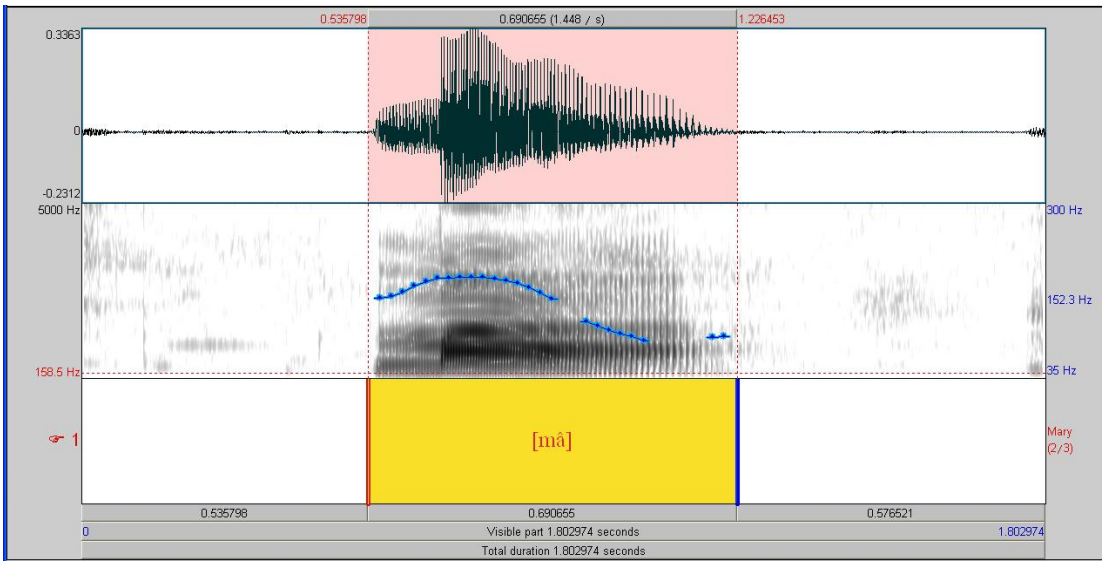


Figure 3.21 The phonetic behavior of HL [falling] tone. Its mean pitch is 151Hz, its maximum pitch is 195HZ and its minimum pitch is 92Hz: /HL ~ba/ [mã̂:] ‘tree/be.old’



As the three figures above (Figure 3.19, Figure 3.20, and Figure 3.21) have shown, Kakua’s phonological tone distinctions represent lexical contrasts.

Phonologically active (L)ow tone is contrastive with toneless affixes:

(113)

/L ~ba/	[mà:]	‘dig out dirt leaving it by the side of where the hole is’
/~ba-/	[ma-]	‘2sg’ (prefix)

The phonetic behavior of toneless formatives (particles, affixes, clitics) is subject to: 1) the tonal specification of the root to which these formatives are attached, and 2) their position within the phonological word (prominence word level intonation pattern assigns a prominence to the right of the phonological word; see Section 3.2.1 for description of word-level prominence pattern).

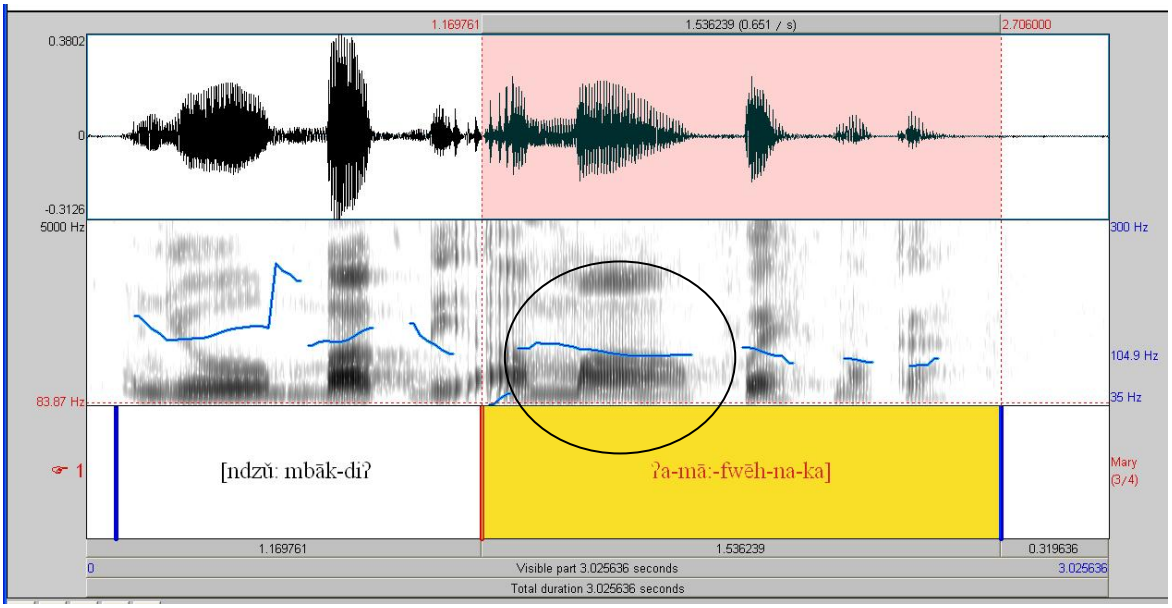
Finally, Figure 3.22 below shows the occurrence of (L)ow tone in context, where L is a target pitch, supporting the conclusion that L tone is not phonologically inert.

Figure 3.22 Low tone in context.

/ LH *ju* L *bak-di?* *ʔa-*L*~ba-*L*f*^{w}*eh-~da-ka*/ [ⁿdʒǔ: ᵐbàk-diʔ ʔa-mà:-fèh-na-ka]

armadillo dirt-NON.SUBJ 3sg.masc-dig.a.hole-keep/put.inside-?PROG?-PRES

'The armadillo is digging (has dug) a hole in the ground, and should be inside or is keeping something inside the hole'.



3.2.2.4 Exceptional cases

As stated in the introduction of this section, every lexical root (excluding formatives as some affixes, clitics and other particles) must be specified for tone, and each root must have one, and only one, tone, resulting in a distributional restriction for the occurrence of tone. This restriction is consistent throughout the data in hand, with the exception of two examples where two tones co-occur within the same morpheme:

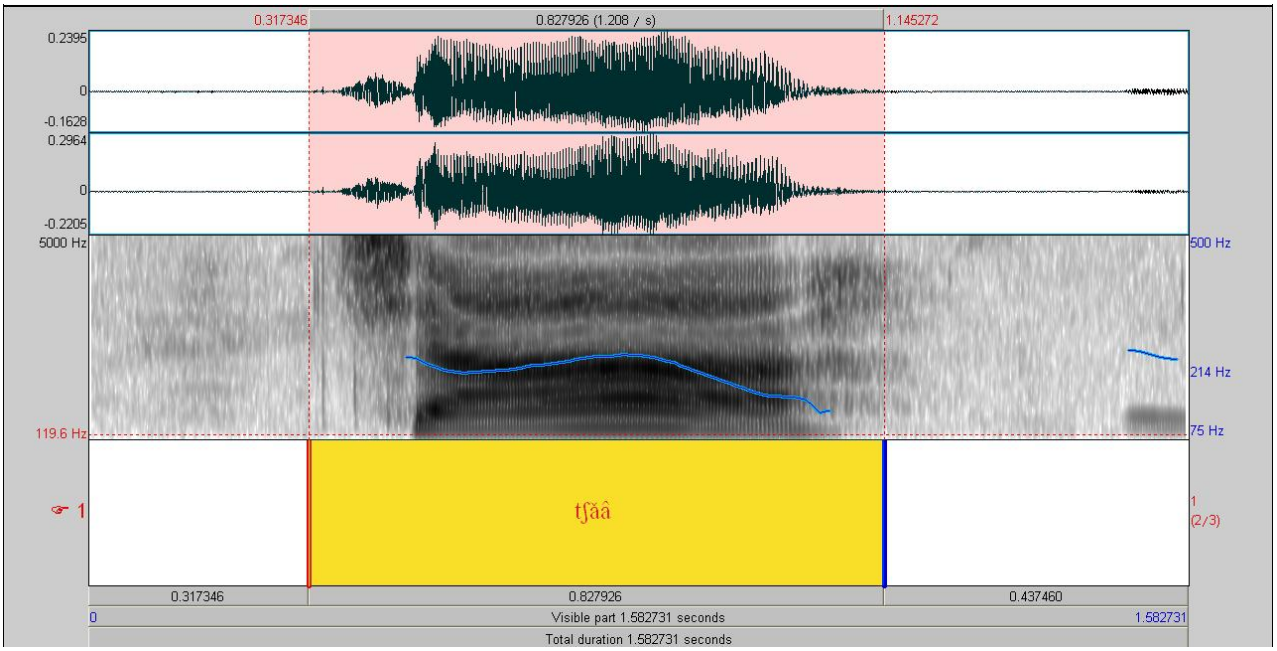
(114) /LH+HL j’aa/ [ʧǎâ] ‘lung’

/LH+HL ~j’ee?/ [ʧɛ̌ɛ̂?] ‘sardine sp’

The linguistic motivation to explain these two exceptional cases need more study. Although premature, a plausible hypothesis is that such tone-compounded forms are derived from a compounding of roots with different tone distinctions that fused into a single root. However, the source from which these forms might have been derived is not transparent and at this point I will limit myself to simply mentioning these two exceptional cases.

Figure 3.23. Tone compounding.

/LH+HL j’aa/ [ʧǎâ] ‘lung’



SECTION 4: SYLLABLE STRUCTURE

4.1 General description: syllable

The basic syllable structure in Kakua is CVC. Most of Kakua's roots are monosyllabic (84% of the lexical word list used for this work). Syllables without an onset occur only in V-initial suffixes. All words and all roots are required to have an onset, except for V-initial suffixes, which lack an onset.

Though at a lower rate, open syllables (CV) are also encountered. In word-final position, however, these open syllables undergo phonetic vowel lengthening, forming heavy syllables (CV:).

The process of phonetic vowel lengthening, together with Kakua's preferred CVC syllabic structure, seeks to produce heavy syllables as the ideal prototype of syllabic structure. The syllabic weight can be understood in terms of a continuum favoring CVC syllables, and whenever an open syllable cannot be avoided, then phonetic vowel lengthening provides extra weight to the underlying structure. Ideally, this continuum will gradually become flexible in order to include less preferred structures until finally reaching the less heavy syllabic structure:

CVC > CV: > CV > VC

/CVC/	includes: content word roots, affixes
/CV/ (and [CV:])	includes: content word roots, affixes
/VC/	includes: V-initial suffixes

Grammatical markers, like imperative or possessive markers, that do not fully satisfy any of the syllabic structures attach to a preceding syllable, forming an ideal heavy syllable:

(115) *ma-**mě+é*** *ma-**měé***

2sg-**call.for.someone+imperative**

Call (him)!

In mono- and bisyllabic loans involving root-final open syllables the CVC structure is adapted whenever possible, demonstrating a preference for the CVC syllabic pattern. In borrowings with open syllables, by default the glottal stop /ʔ/ is epenthesized in the coda position. Speakers of Kakua speaking Spanish usually transfer the CVC pattern to the Spanish structure:

(116)

Spanish	Kakua	
[si]	[siʔ]	'*yes*'
[pa.pel]	[pa.pe.laʔ]	'*paper*'
[me.sa]	[me.saʔ-paʔa]	'*table-CL.flat*'
[ma.ɾi.na]	[ʔĩnãʔ]	'*Marina*' (proper name)

As noted in the examples above, in loan words the glottal stop occurs as a default epenthetic consonant as a strategy to increase syllable weight, forming an ideal heavy CVC syllable, whether epenthesized in onset or in coda position.

Vowel-initial suffixes do not insert any epenthetic consonant at the syllable/morpheme boundary even when the morpheme to which the suffix attaches is an open-syllable morpheme: CV-VC. This shows evidence that these V-initial suffixes don't have empty consonant slots. Some of these V-initial suffixes do have empty vowel slots (e.g. past marker Vp) in which cases the vowel in the suffix copies the vowel quality of the root to which the suffix is bound.

4.2 Bisyllables, morpheme and word structure

As noted above, Kakua does not have diphthongs or syllable-internal consonant clusters. Bisyllabic morphemes are no exception and neither consonant clusters nor diphthongs are allowed within the same morpheme. This sets a CV-CV syllabic structure for bisyllabic morphemes; however, note that bisyllabic morphemes represent only a 16% of the total data set, for the remaining majority of the data set, a CVC syllabic structure is the overall ideally preferred syllabic structure.

At the morpheme and word level consonant clusters are frequently avoided by inserting an epenthetic vowel in between adjacent cross-morphemic consonants. The epenthesized vowel copies the vowel of the morpheme that precedes it in the bound construction. However, some Spanish loans (as noted above in Section 2.1.2.6) have a consistent /a/ epenthethic vowel. A probable explanation for this exception is that these borrowings were introduced into Kakua through contact with Cubeo or other Tukanoan language instead of assuming that the consistency with the epenthethic /a/ is responding to a process developed in Kakua (see examples in (117) below).

As noted above, Kakua strongly favors monosyllabic roots. Native Kakua roots are limited to two syllables. Roots with more than two syllables are highly likely to be borrowings:

(117) *paróla?* 'lantern' (Spanish *farol*)
ʧilúla? 'pants' (through Cubeo? probably originally from Portuguese)
piʧana 'cat' (Portuguese 'bicho', probably borrowed via Nheengatu and Tukanoan. See Epps 2009:8 for discussion of same term in Hup)

The multisyllabic borrowings from Spanish are often shortened when adopted into Kakua. Examples of these shortenings includes names of persons: *J'ẽd'* [ʧent] 'Vicente', *Ĩnã?* [ʔĩnã?] 'Marina', *J'abẽ?* [ʧabẽ?] 'Isabel'. In a few exceptional cases borrowed words do not undergo reduction of syllables; most of these cases correspond to Spanish loans that have word-final consonants that cannot occur in this position in Kakua, i.e. [l], [ɾ].

Such is the case of the word for book *papela?,* borrowed from Spanish *papel* ‘paper’. Because Kakua lateral /l/ cannot occur in word-final position, an epenthetic vowel is inserted in the word-final position; finally, a glottal stop is also epenthesized in the final position, following Kakua’s preference for closed syllables (see however discussion above regarding the possibility of these forms being borrowed already with this form from Cubeo).

Most bisyllabic monomorphemic words in Kakua exhibit a form of vowel harmony, whereby the same vowel quality is shared across the two syllables. At this point of my research I have not yet dedicated sufficient analysis to reach a robust explanation for the cases where vowel harmony does not occur in bisyllabic roots. One possible analysis to account for bisyllabic words in which vowels do not share the same quality is that these words are originated from lexicalization of a bimorphemic form:

(118) /wê.bit/ ‘child’ probably from /~wĕʔ/ ‘change of shape’ (like from cocoon to butterfly) + /bit/ ‘other’: ‘other/one that is changing/mutating’

(119) /~bu.li-j’û/ ‘ear-CL.cover’ probably from /~bu/ ‘edge/border/ + ?/laj/? ‘make noise’ or ?/did/? ‘send a message’?.

Again, this hypothesis is still very speculative, and future study should seek to resolve this question. Most of Kakua’s bisyllabic roots do exhibit vowel harmony. Those that do not show vowel harmony are typically body terms or kin terms.

SECTION 5: MORPHOPHONEMICS

This section will briefly address the morphophonemic processes in segmental and suprasegmental phonology. More study will deepen our understanding of these morphophonemic and morphophonetic processes.

Kakua shows processes of vowel copying, involving suffixes of the type -V, and -VC, which do not specify the quality of the vowel. These suffixes simple copy the vowel of the root to which they attach. When the root is bisyllabic and the vowels have different qualities, the first vowel of the root is copied.

The following examples illustrate the imperative suffix –V. Imperative suffix receives a high pitch tone which I am analyzing as being related to (speech)-intonation strategy rather than being associated with the segment at the underlying level:

(120) */~ba-hùj-**u*** *~wĕb-diʔ/* [ma-hùʤ-**ú** wĕm-diʔ]
2SG-listen-**IMPER** 1SG-NON.SUBJ
'listen to me!'

(121) */~bĕb-diʔ ~wĕb-lapiz-dub'-~da ~ba-hʉ̀d-**ʉ́**/*
2SG-NON.SUBJ 1SG-lápiz-CL:long.pointed-?PROGR? 2SG-hold/keep-**IMPER**
[mĕm-diʔ wĕm-lapiz-dub̰-na ma-hʉɾʉ́]
'Save a pencil for me'

(122) */~ba-~bĕ-e/* [ma-mĕ:-**é**]
2SG-call.out.someone-**IMPER**
'Call him/her'

(123) */~ba-~hîgaʔ-**i**-~kad-~da-ka/* [ma-hĩ̃ŋãʔ-**í**-kan-na-ka]

2SG-be.sad-**IMPER-**NEG-ʔPROGRʔ-PRES

‘Don’t be sad!’

Past marker -Vp:

(124) */~bâ-~daʔ* *ʔa-t-ʔâ:k-bèh-ẹ̀p-ta-b’e/* [mâ-naʔ ʔa-t-ʔâ:k-bèh-**ẹ̀p̃**-ta-b’é]
tree-CL:tree.like 3SG.MASC-NON.SENS-fall.vertically-go-**PAST-**NON.SENS-REC.PAST

‘The tree was just falling down’

(125) */kăd’-diʔ* *at-hîguʔ-ḭ̀p-wʉt-b’e/* [kănt-diʔ ʔa-t-hîguʔ-**ḭ̀p̃**-wʉt-b’é]
3SG.FEM-NON.SUBJ 3SG.MASC-NON.SENS-to.appear-**PAST**-REPORT-REC.PAST

‘A spirit appeared (in front of) to her’

(126) /~fíd hûj-~wa kĕt-hŭj-**ṵ́p**-b’e/
yesterday take.a.handful.of.grains-PL(cubeos) 3PL-arrive.here-**PAST**-REC.PAST

‘The Cubeos came yesterday’ [fín hûj-wã kĕt-hŭy-**ṵ́p̃**-be]

Note that the copied vowel is copied with all of its segmental and suprasegmental properties. In (127.a) below, the nasalization property of the root-vowel is fully copied to the vowel-initial suffix, while in (127.b) the vowel-initial suffix is not nasalized because the root to which it attaches is not nasal:

(127) a. **-~Vp**
/~bi-~j'àh-**à**p-b'e/ [mi-ʧ̃ãh-**ã̀**p-b'e]
3SG.FEM-do/make-PAST-REC.PAST
'She did!'

b. **Vp**
/j'â ~ʔa-j'âʔ-**a**p-b'e/ [ʧâ: ʔã-ʧâʔ-**à**p-b'e]
flower 3sg.masc-blossom-past-rec.past
'The flower blossomed'

Processes of insertion or deletion of segments in Kakua are, in general, restricted to lexical borrowings. In monosyllabic Spanish loans with open syllables (CV), for example, a glottal stop is commonly inserted resulting in the preferred Kakua heavy syllabic structure CVC (see examples in Section 4, Syllable and word Structure). Likewise, multisyllabic loans from Spanish (often personal names) usually undergo reduction by deletion of segments:

(128) *ʧent* 'Vicente'
bîtat-daʔ (guitar-CL.round) 'guitarra' (from Spanish *guitar*)

Processes of deletion are much more common than insertion of segments; nonetheless, some borrowings from Spanish have epenthesized vowels to avoid clusters of consonants:

(129)	Kakua	Spanish	English
	*Ped**e**ro*	'Pedro'	'Pedro' (proper name)
	***Ba**rabadora*	'grabadora'	'recorder'

Sometimes I have found instances of devoicing occurring in fast speech as a process of homorganic (regressive) assimilation across morpheme boundaries or root-affix boundaries. This process can be realized as either full devoicing (123) or partial

devoicing (124). This process of devoicing, however, is not consistent across speakers or even for the same speaker:

(130) /b/ full devoicing: [^{m}b]→ [p] / p-_

[*ʔã-bèh-èp-^{m}b'e*] → [ʔã-bèh-è**p-p**e]

3SG.MASC-go-PAST-REC.PAST

'He went'

(131) /b/ partial devoicing: [^{m}b] → [b]/p-_

[*ʔã-bèh-èp-^{m}b'e*] → [ʔã-bèh-è**p-b**e̯]

3SG.MASC-go-PAST-REC.PAST

'He went'

Intonation tends to fall towards the end of the phonological word. The phonological word associates a word-level prominence with the first high pitch at the left-most edge of the phonological word and gradually downdrifts toward the end of the phonological word (i.e. toward the right edge). A high tone then associates with the last syllable of the clause as a boundary/clausal marker:

(132) [*wə́bit-bu̍* *mʉ̀-hìw̃-hĩ* *ʔĩ-tìwa̍-pûniʔ* *hìwì*

child-?TOP? house-jaguar-CONJ 3PL-play-WHILE tapir

ʔã-fèʤ-at-bé]↗

3SG.MASC-escape-?-REC.PAST

'While the child was playing with the dog, the tapir escaped'

This intonation pattern applies to declarative as well as to interrogative clauses. Interrogative clauses are marked with the interrogative marker -~dit [nit] suffixed to the verbal word, having no intonation difference with declarative clauses.

SECTION 6: CONCLUSION

This work has presented a preliminary analysis of the basic aspects of Kakua phonology. This analysis is not conclusive and only accounts for the data in hand, which will be expanded with further fieldwork. Nonetheless, from this initial analysis we now have a better understanding of the sound system of Kakua, a little-described and endangered language.

A number of grammatical properties shared by many languages of the Vaupés River basin have served as grounds to define the Vaupés as a linguistic area within the wider Amazonia area. Among these shared grammatical properties are found a few phonological features such as:

(i) Contrastive lexical tones (Aikhenvald & Dixon 1999:10)
(ii) Nasalization as a prosodic feature (Aikhenvald 2007:13)
(iii) Voiced alveolar stop and liquid as allophones (Aikhenvald 2007:13)

As seen through this preliminary analysis, Kakua phonology displays all three of these shared phonological properties. Although it is possible that Kakua developed these properties on its own, I am more inclined to think that Kakua's phonological features of contrastive lexical tones, nasalization as a prosodic feature, and voiced alveolar stop and liquid/flap as allophones, suggest that Kakua fits into the Vaupés area linguistic profile. It is worth mentioning that there is also the possibility that some features were already in place for Kakua-Nukak phonology and that somehow in an earlier contact situation some of these Kakua-Nukak's phonological features had an influence on the other Vaupés languages.

Kakua also shows other phonological features that seem to not be very widely shared among its Tukanoan neighbors. An example of this is Kakua's syllabic structure: whereas most of Kakua's neighboring Eastern Tukanoan languages do not have closed

syllables,[5] Kakua presents a strong preference for CVC syllabic structure, such that roughly 84% of monosyllabic roots have a CVC structure. Nadahup languages, including Hup (Epps, 2008) and Yuhup (Ospina, 2002), also spoken in the Vaupés area, seem to be the only other languages in the region that are reported to also have a strong preference for closed syllables structures. Associated with the preference for closed syllables, Kakua's post-nasalized voiced stops are salient not only within Kakua's own phonological realization of voiced stops, but also are a salient feature of these Nadahup languages. Post-nasalized stops have also been described as a prominent phonological feature of Hup (Epps, 2005), and Yuhup (Ospina, 2002).

Finally, while I acknowledge that the analysis here is still very preliminary, it defines an interesting set of unanswered questions for future studies. Hopefully, such future research will result in a more elaborated analysis and provide us with one more piece to the typological puzzling understanding of the languages of the Amazonian area.

[5] Barnes (1999:210) observes that most of the East Tukanoan languages have no coda. Moreover, in those languages said to have a coda, this is always a glottal stop, but the status of the glottal stop has been analyzed differently by different authors. See Stenzel 2007 for discussion of the glottal in Wanano.

References

Aikhenvald, Alexandra. 2007. Grammars in Contact. A Cross Linguistic Typology.

Alexandra Aikhenvald & R.M.W Dixon (eds). Cambridge. Cambridge University Press.

Aikhenvald, Alexandra. 2003. A Grammar of Tariana, From Northwest Amazonia. Cambridge. Cambridge University Press.

Aikhenvald, Alexandra & R.M.W Dixon. 1999 (eds). The Amazonian Languages. Cambridge Universtiy Press.

Anderton, A. 1989. The Sounds of Cacua, based on data collected by the Summer Institute of Linguistics. Ms. UCLA (as cited in www.wals.info)

Bolaños, Katherine & Patience Epps. 2009. 'Linguistic Classification of Kakua, a language of Northwest Amazonia'. Paper presented at the Conference of Indigenous Languages of Latin America CILLA-IV. The University of Texas at Austin, October 31st, 2009.

Cabrera, Gabriel; Carlos Franky & Danny Mahecha. 1999. Los Nikak: Nómadas de la Amazonía Colombiana. Bogotá, Ed. Universidad Nacional de Colombia. UN

Cathcart, Marilyn E. 1972. Cacua gramar, write-up stage 2. Manuscript, SIL.

Cathcart, Marilyn E. 1973. 'Cacua'. In Aspectos de la Cultura Material de Grupos Étnicos de Colombia. Editorial Townsend. Lomalinda, Colombia. SIL.

Cathcart, Marilyn E. 1979. Fonología del Cacua. In Sistemas Fonológicos de Idiomas Colombianos, v.4. Lomalinda, Colombia: SIL.

Cathcart, Marilyn E & Stephen Levinson. 1977. The encoding of chronological progression in Cacua narratives. In Discourse Grammar: Studies in Indigenous Languages of Colombia, Panamá and Ecuador, part 2, Robert Longacre and Frances Woods (eds), 69-94. SIL Publications in Linguistics and Related Fields 52 [2]. Dallas: SIL and The University of Texas at Arlington.

Chacon, Thiago. 2009. 'Preliminary Investigation on Proto-Tukanoan Stops and Tukanoan Family Classification'. Handout: Paper presented at the International Conference of Americanists: Cultural and linguistic interaction in the Upper Rio Negro Region, Amazonia.

Barnes, Janet. 1999. 'Tucano'. In The Amazonian Languages. Alexandra Aikhenvald & R.M.W Dixon (eds). Cambridge Universtiy Press.

Epps, Patience. 2005. A Grammar of Hup. PhD dissertation. Charlottesville, University of Virginia.

Epps, Patience. 2007. 'The Vaupés melting pot'. In Grammars in Contact. A Cross linguistic Typology. Alexandra Aikhenvald & R.M.W Dixon (eds). Chapter 11. Cambridge Universtiy Press.

Epps, Patience. 2008. A Grammar of Hup. Mouton & Gruyter. Berlin.

Epps, Patience. 2009. 'Loan words in Hup, a Nadahup langauge of Amazonia'. In *Loanwords in the world's languages: a comparative handbook*. Martin Haspelmath and Uri Tadmor (eds)., MPI EvA, Leipzig. Berlin: Mouton de Gruyter.

Huber, Randall Q & Robert. B Reed. 1992. Vocabulario Comparativo: Palabras Selectas en Lenguas Indígenas de Colombia. Santafé de Bogotá, Colombia: Instituto Lingüístico de Verano.

Hyman, Larry M. 2010. 'Amazonia and the Typology of Tone Systems'. Paper presented at the conference *Amazonicas III*. Universidad Nacional de Colombia, Bogotá, Colombia. April 19th

Hyman, Larry M. n.d. Cacua [CBV] Maku Colombia. Unpublish. Two-page paper interpretation of Kakua's tone system according to Cathcart's (1979) work.

Jackson, Jean. 1983. The Fish People: Linguistic Exogamy and Tukanoan Identity in Northwest Amazonia. Cambridge: Cambridge University Press.

Girón Higuita, Jesús Mario. 2008. *Una Gramática del Wãênsöjöt (Puinave)*. PhD diss., Vrije Universiteit. Published by LOT. The Netherlands.

Greenberg, Joseph. 1960. The General Classification of Central and South American Languages. In: Anthony Wallace (ed.). Men and Cultures: Selected Papers of the 15 International Congress of Anthropological and Ethnological Sciences. Philadelphia, University of Pennsylvania Press: 791-94.

Gamkrelidze, T. V. 1975. 'On the correlation of stops and fricatives in a phonological system'. In Lingua 35, 231-261.

Kaufman, Terrence. 1990. 'Language History in South America: What we know and how to know more'. In Amazonian Linguistics. David L. Payne (ed), pages 13–74. Austin, University of Texas Press.

Koch-Grünberg, Theodore. 1906. Die Die Maku. In: *Anthropos,* v.1: 877-906.

Koch-Grünberg, Theodore. 1913. Abschlusz meiner Reise durch Nordbrasilien zum Orinoco, mit besonderer Berücksichtigung der von mir besuchten Indianer stämme. In Zeitschrift für Ethnologie, t. XLV, pages 448-478.

Landaburu, Jon. 2000. Clasificación de las Lenguas Indígenas de Colombia. In Lenguas Indígenas de Colombia, Una Visión Descriptiva. Gonzáles, Maria Stella (ed). Bogotá, Intituto Caro y Cuervo, pages 25-48.

La Rotta, Luz Marina. 1977. Comparación fonológica entre el cacua y el español. Artículos en Lingüística y Campos Afines 3: 1–21. Bogatá: Summer Institute of Linguistics.

Loukotka, Cestmir. 1968. Classification of South American Indian Languages. J. Wilbert Ed., Los Angeles, University of California.

Maddieson, Ian. 1984. Patterns of Sound. Cambridge. Cambridge University Press.

Mahecha Rubio, Danny. 2009. El nombre en nikak. En: W. Leo Wetzels (ed.), *The linguistics of endangered languages. Contributions to morphology and Morphosyntax:63-93.* Utrecht: LOT.

Mahecha Rubio, Danny; Gabriel Cabrera Becerra and Carlos Eduardo Franky Calvo 2000 Algunos aspectos fonético-fonológicos del idioma nukak/nïkak. In: M.S. González de Pérez & M.L. Rodríguez de Montes (eds.), *Lenguas indígenas de Colombia: una visión descriptiva: 547-560.* Santafé de Bogotá: ICC.

Martins, Valteir. 2005. Reconstrução fonologicado Protomaku Oriental. PhD Dissertation, Vrije Universiteit, Amsterdam.

Martins, Silvana A. and Valteir Martins. 1999. Makú. In The Amazonian Languages, R. M. W. Dixon and Alexandra Aikhenvald (eds.), 251–268. Cambridge: Cambridge University Press.

New Testament: El Nuevo Testamento en Cacua. 2004. Published by Liga Biblica Colombia.

Ohala, John J. 1983:189-216. The Origin of Sound Patterns in Vocal Tract Constraints. In Peter F. MacNeilage (ed), The Production of Speech. New York: Springer Verlag. Heidelberg and Berlin.

Ospina Bozzi, Ana Maria. 2002. Les structures élémentaires du Yuhup Maku, langue de l'Amazonie Colombienne: Morphologie et syntaxe. Ph. D. diss., Université Paris 7 –Denis Diderot.

Ramirez, Henri. 2001. Família Makú ou família Uaupés-Japura? [Makú family or Uaupés-Japura family?]. Paper presented at the meeting of ANPOLL, Belém, Brazil.

Rivet, Paul and Constant Tastevin. 1920. 'Affinités du Makú et du Puinave'; In Journal de la Société des Américanistes de París, n.s. t XII: 69-82. París.

Silverwood-Cope, Peter. 1972. A contribution to the ethnography of the Colombian Makú. Ph.D. diss., Cambridge University.

Sorensen, Arthur Jr. 1967. 'Multilingualism in the Northwest Amazon'. In American Anthropologist 69:670-84.

Stenzel, Kristine. 2007. Glottalization and other suprasegmental features in Wanano. IJAL, vol. 73, no. 3, July 2007, pp. 331–66. University of Chicago.